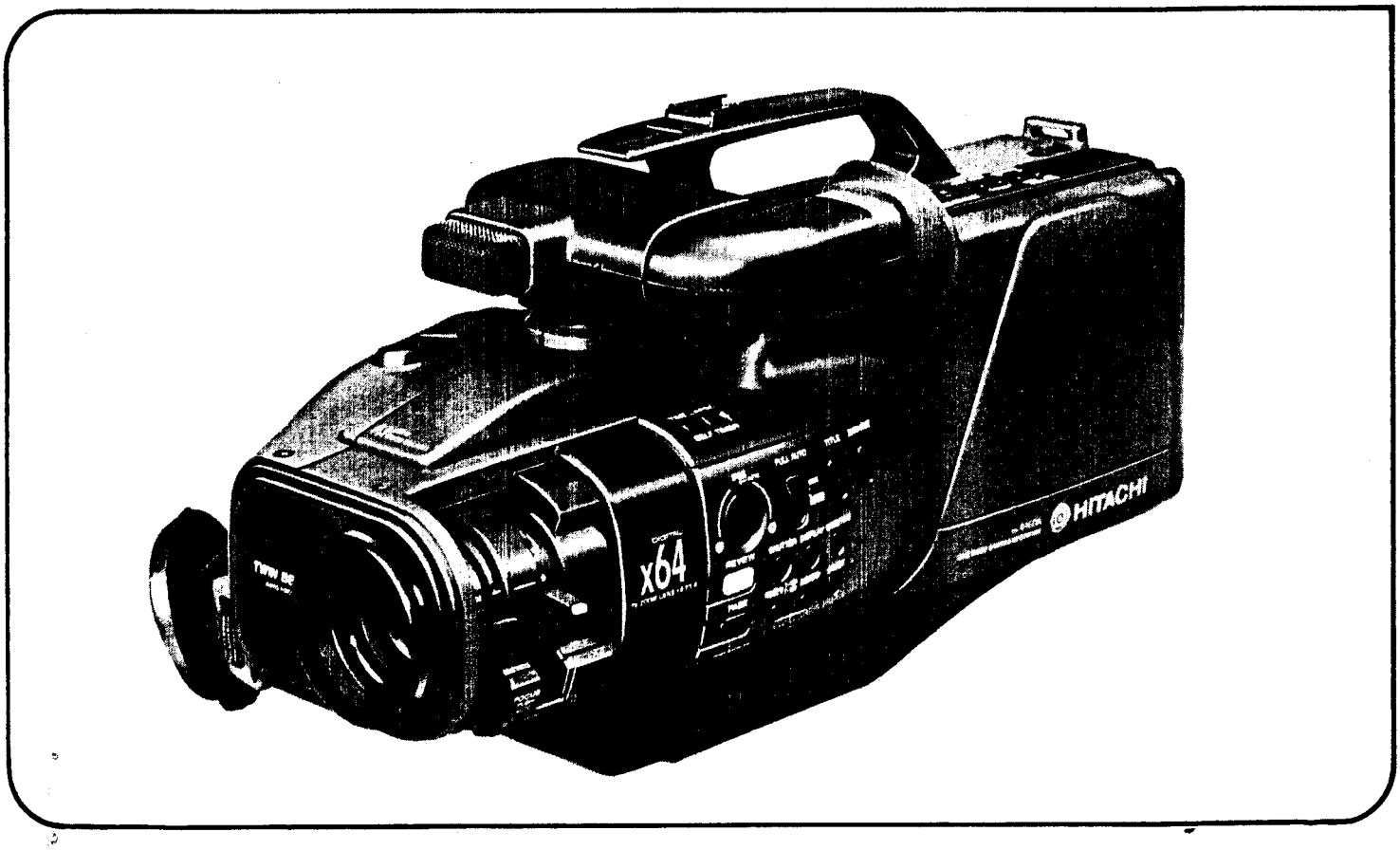
HITACHI

Instruction Manual

VHS

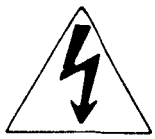
Video Camera/Recorder

VM-4450A



(PX)

WARNING: TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS UNIT TO RAIN OR MOISTURE.



CAUTION

RISK OF ELECTRIC SHOCK
DO NOT OPEN

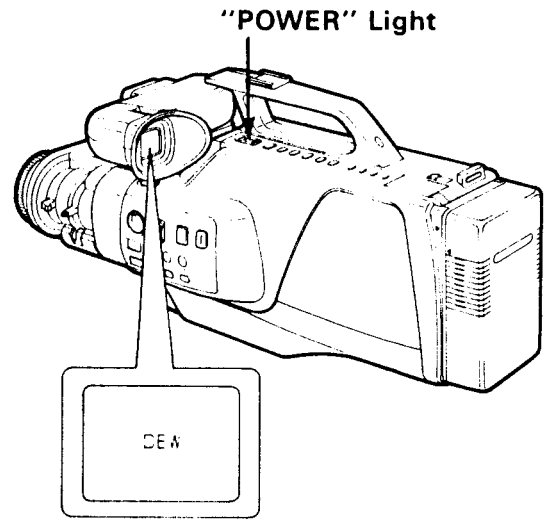
CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER – SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

This symbol warns the user that uninsulated voltage within the unit may have sufficient magnitude to cause electric shock. Therefore, it is dangerous to make any kind of contact with any inside part of this unit.

This symbol alerts the user that important literature concerning the operation and maintenance of this unit has been included. Therefore, it should be read carefully in order to avoid any problems.

MOISTURE

Moisture may occur if the video camera/recorder is moved from a cold area to a warm humid area. A flashing **"POWER"** light and **"DEW"** indication in the viewfinder indicate that moisture is on the recorder mechanism, which could result in tape damage. When the **"POWER"** light and **"DEW"** indication in the viewfinder are flashing the unit will not operate. When this happens, press the **"EJECT"** button, remove the tape, and wait for the moisture to dry ..... the **"POWER"** light and **"DEW"** indication in the viewfinder will stop flashing.



PRECAUTIONS

Any problems that occur as a result of any of the following conditions will not be covered by our warranty.

- Be careful that no water, dust or sand enters the camera/recorder.
- When you are not using the camera/recorder, switch off the power and attach the lens cap.
- When you shoot at a scene which contains an extremely bright object such as the sun or a light source, a bright vertical bar may appear in the picture.
  Your camera/recorder is functioning properly, but the solid-state pickup device (C.C.D) usually causes this as an inherent characteristic. Try to avoid shooting an excessive bright object directly.
- Be sure not to leave it in a place where the temperature exceeds 120°F, or the pickup device may be damaged.
  Dangerous includes:
  - Inside a car with the windows closed and in direct sunshine.
  - Near heating appliances.
- Do not leave the viewfinder lens facing sunlight for a prolonged period, or the phosphorescent surface of the cathode ray tube may be damaged.

Thank you for choosing the VHS video camera/recorder. For maximum pleasure and convenience please read these simple instructions before operating your camera/recorder.

WARNING: Many television programs and films are copyrighted. In certain circumstances, copyright law may apply to private in-home video taping of copyrighted materials.

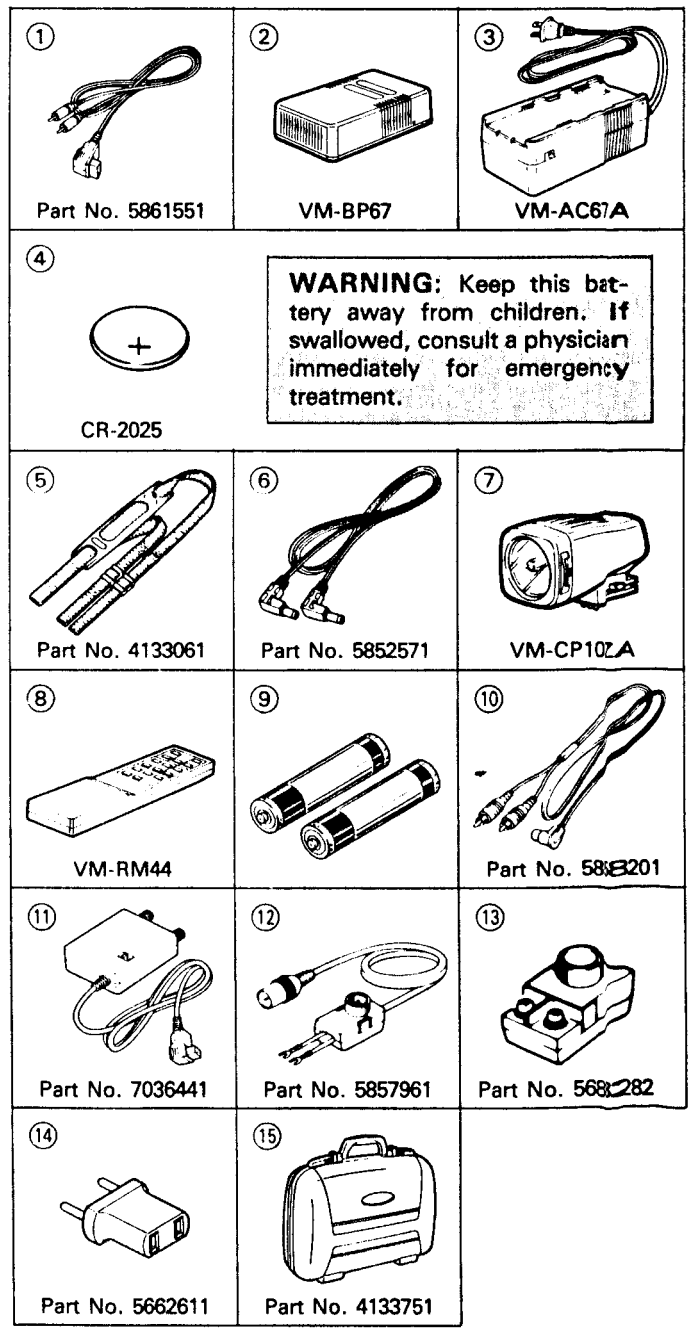
FEATURES

- Digital Zoom up to X 64
- Solid-state camera pickup
- Auto Focus Power Zoom Lens with macro feature
- Full record and playback capability with standard VHS cassette
- High speed shutter
- Time-lapse and one-shot recording
- Wireless Remote Control
- 6 Programmable Synchro Edit
- Flying Erase Head
- Video dub
- Audio dub
- Time and date
- Titler
- Index Signal
- Auto Head Cleaning System

ACCESSORIES

Check to make sure you have the following components and accessories (besides the camera/recorder unit itself) before disposing of the packing material.

1. Video/Audio Output Cord
2. Lead-acid rechargeable Battery Pack
3. AC Adaptor/Charger
4. Battery for Date/Time
5. Shoulder Strap
6. DC Cord
7. DC Camera Light
8. Wireless Remote Control
9. Two "AA" Size Batteries
10. Video/Audio Input Cord
11. RF Converter Unit
12. 75-ohm Coaxial Cable with Antenna Adaptor
13. Antenna Adaptor (300-ohm to 75-ohm)
14. AC Plug Adaptor
15. Carrying Case



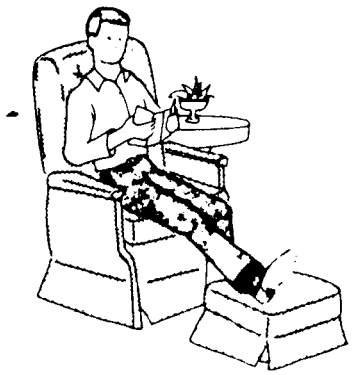
IMPORTANT SAFEGUARDS

In addition to the careful attention devoted to quality standards in the manufacture of your video product, safety is a major factor in the design of every instrument. But, safety is your responsibility too.

This page lists important information that will help to assure your enjoyment and proper use of a Video Camera/Recorder and accessory equipment. Please read it carefully before operating your video product and keep it in a handy place for future reference.

INSTALLATION

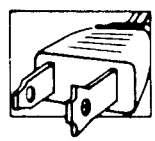
1 **Read and Follow Instructions**—All the safety and operating instructions should be read before the video product is operated. Follow all operating and use instructions.



2 **Retain Instructions**—The safety and operating instructions should be retained for future reference.

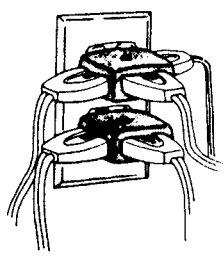
3 **Heed Warnings**—Comply with all warnings on the video product and in the operating instructions.

4 **Polarized Plug**—This video product is equipped with a polarized alternating-current line plug (a plug having one blade wider than the other). This plug will fit into the power outlet only one way. This is safety feature. If you are unable to insert the plug fully into the outlet, try reversing the plug. If the plug should still fail to fit, contact your electrician to replace your obsolete outlet. To prevent electric shock do not use this polarized plug with an extension cord, receptacle or other outlet unless the blades can be fully inserted without blade exposure. If you need an extension, use a polarized cord.



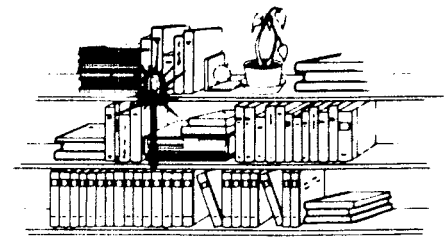
5 **Power Sources**—This video product should be operated only from the type of power source indicated on the marking label. If you are not sure of the type of power supply to your home, consult your video dealer or local power company. For video products intended to operate from battery power, or other sources, refer to the operating instructions.

6 **Overloading**—Do not overload wall outlets and extension cords as this can result in a risk of fire or electric shock. Overloaded AC outlets and extension cords are dangerous, and so are frayed power cords, damaged or cracked wire insulation and broken plugs. They may result in a shock or fire hazard. Periodically examine the cord and have it replaced by your service technician if appearance indicates damage or deteriorated insulation.



7 **Power-Cord Protection**—Power-supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit from the appliance.

8 **Ventilation**—Slots and openings in the cabinet are provided for ventilation to ensure reliable operation of the video product and to protect it from overheating. These openings must not be blocked or covered. The openings should never be blocked by placing the video product on a bed, sofa, rug, or other similar surface. This video product should never be placed near or over a radiator or heat register. This video product should not be placed in a built-in installation such as a bookcase or rack unless proper ventilation is provided or the video product manufacturer's instructions have been followed.



9 **Attachments**—Do not use attachments unless recommended by the video product manufacturer as they may cause hazards.

Caution: Maintain electrical safety. Powerline operated equipment or accessories connected to this unit should bear the UL listing mark or CSA certification mark on the accessory itself and should not have been modified so as to defeat the safety features. This will help avoid any potential hazard from electric shock or fire. If in doubt, contact qualified service personnel.

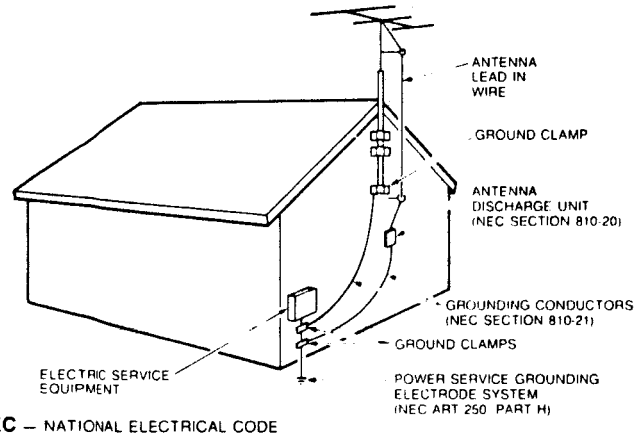
10 **Water and Moisture**—Do not use this video product near water—for example, near a bath tub, wash bowl, kitchen sink, or laundry tub, in a wet basement, or near a swimming pool, and the like.

11 **Accessories**—Do not place this video product on an unstable cart, stand, tripod, bracket, or table. The video product may fall, causing serious injury to a child or adult, and serious damage to the appliance. Use only with a cart, stand, tripod, bracket, or table recommended by the manufacturer, or sold with the video product. Any mounting of the product should follow the manufacturer's instructions, and should use a mounting accessory recommended by the manufacturer.

11A An appliance and cart combination should be moved with care. Quick stops, excessive force, and uneven surfaces may cause the appliance and cart combination to overturn.

12 **Outdoor Antenna Grounding**—If an outside antenna or cable system is connected to the video product, be sure the antenna or cable system is grounded so as to provide some protection against voltage surges and built-up static charges. Section 810 of the National Electrical Code, ANSI/NFPA No. 70-1984, provides information with respect to proper grounding of the mast and supporting structure, grounding of the lead-in wire to an antenna discharge unit, size of grounding conductors, location of antenna-discharge unit, connection to grounding electrodes, and requirements for the grounding electrode. See example below.

EXAMPLE OF ANTENNA GROUNDING


ANTENNA LEAD IN WIRE
GROUND CLAMP
ANTENNA DISCHARGE UNIT (NEC SECTION 810-20)
GROUNDING CONDUCTORS (NEC SECTION 810-21)
GROUND CLAMPS
ELECTRIC SERVICE EQUIPMENT
POWER SERVICE GROUNDING ELECTRODE SYSTEM (NEC ART 250 PART H)

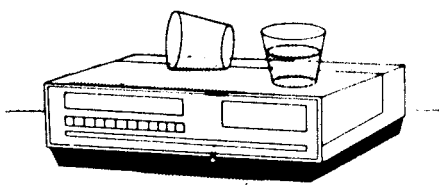
NEC – NATIONAL ELECTRICAL CODE

13 **Power Lines**—An outside antenna system should not be located in the vicinity of overhead power lines or other electric light or power circuits, or where it can fall into such power lines or circuits. When installing an outside antenna system, extreme care should be taken to keep from touching or approaching such power lines or circuits as contact with them might be fatal. Installing an outdoor antenna can be hazardous and should be left to a professional antenna installer.

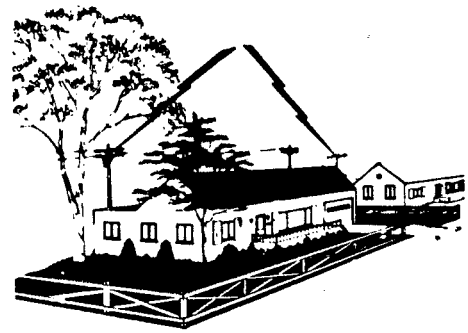
USE

14 **Cleaning**—Unplug this video product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.

15 **Object and Liquid Entry**—Never push objects of any kind into this video product through openings as they may touch dangerous voltage points or short-out parts that could result in a fire or electric shock. Never spill liquid of any kind on the video product.



16 **Lightning**—For added protection for this video product during a lightning storm, or when it is left unattended and unused for long periods of time, unplug it from the wall outlet and disconnect the antenna or cable-system. This will prevent damage to the video product due to lightning and power-line surges.



SERVICE

17 **Servicing**—Do not attempt to service this video product yourself as opening or removing covers may expose you to dangerous voltage or other hazards. Refer all servicing to qualified service personnel.

18 **Conditions Requiring Service**—Unplug this video product from the wall outlet and refer servicing to qualified service personnel under the following conditions.

a. When the power-supply cord or plug is damaged.

b. If liquid has been spilled, or objects have fallen into the video product.

c. If the video product has been exposed to rain or water.

d. If the video product does not operate normally by following the operating instructions. Adjust only those controls that are covered by the operating instructions. Improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the video product to its normal operation.

e. If the video product has been dropped or the cabinet has been damaged.

f. When the video product exhibits a distinct change in performance—this indicates a need for service.

19 **Replacement Parts**—When replacement parts are required, have the service technician verify that the replacements he uses have the same safety characteristics as the original parts. Use of replacements specified by the video product manufacturer can prevent fire, electric shock or other hazards.

20 **Safety Check**—Upon completion of any service or repairs to this video product, ask the service technician to perform safety checks recommended by the manufacturer to determine that the video product is in safe operating condition.

IMPORTANT SAFETY INSTRUCTIONS FOR AC ADAPTOR/CHARGER

1. **Save these instructions** — This page contains important safety and operating instructions for AC Adaptor/Charger Model VM-AC67A.
2. Before using AC Adaptor/Charger, read all instructions and cautionary markings on (1) AC Adaptor/Charger, (2) battery and (3) product using battery.
3. Also read all instructions on pages 4 and 5.
4. **Caution** — To reduce risk of injury, charge only rechargeable battery, VM-BP64/BP65/BP66/BP67. Other types of batteries may burst causing personal injury and damage.
5. Do not expose charger to rain or snow.
6. Use of an attachment not recommended or sold by the battery charger manufacturer may result in a risk of fire, electric shock, or injury to persons.
7. To reduce risk of damage to electric plug and cord, pull by plug rather than cord when disconnecting charger.
8. Make sure cord is located so that it will not be stepped on, tripped over, or otherwise subjected to damage or stress.
9. Do not operate charger with damaged cord or plug — replace them immediately.
10. An extension cord should not be used unless absolutely necessary.
    Use of improper extension cord could result in a risk of fire and electric shock. If extension cord must be used, make sure:
    A. That pins on plug of extension cord are the same number, size, and shape as those of plug on charger.
    B. That extension cord is properly wired and in good electrical condition; and
    C. That wire size should be met below:

Minimum AWG size	Length of extension cord (feet)
18	Equal to or less than 100
16	Equal to or less than 150

11. Do not operate charger if it has received a sharp blow, been dropped, or otherwise damaged in any way; take it to a qualified serviceman.
12. Do not disassemble charger; take it to a qualified serviceman when service or repair is required. Incorrect reassembly may result in a risk of electric shock or fire.
13. To reduce risk of electric shock, unplug charger from outlet before attempting any maintenance or cleaning.

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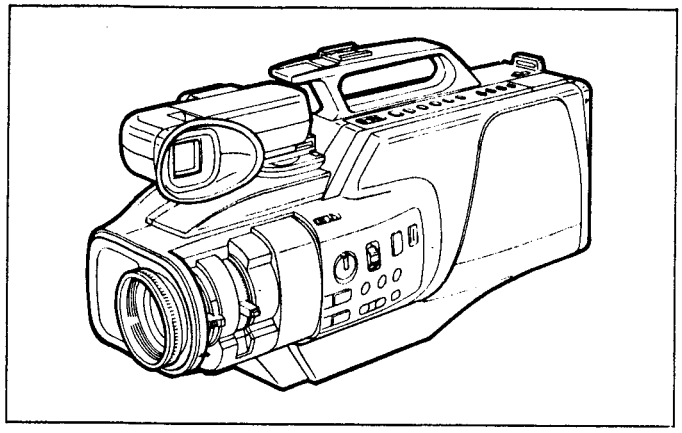
"**Note to CATV system installer:** This reminder is provided to call the CATV system installer's attention to Article 820—22 of the NEC that provides guidelines for proper grounding and, in particular, specifies that the cable ground shall be connected to the grounding system of the building, as close to the point of cable entry as practical".

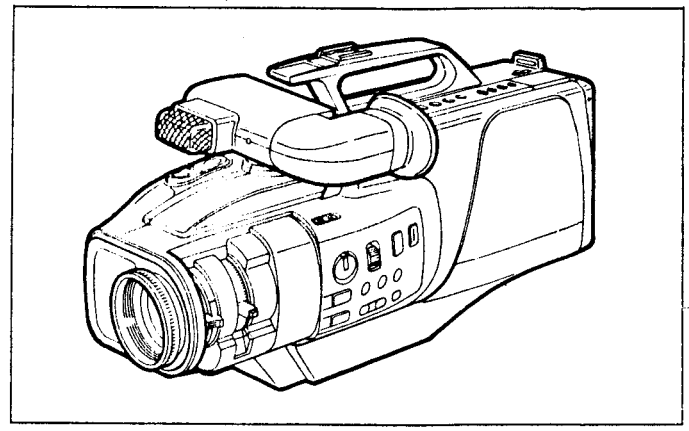
ELECTRONIC VIEWFINDER (EVF)

■ Set the viewfinder to the position shown in the figure when carrying the camera/recorder or storing it in the carrying case.



■ Turn the viewfinder to the position shown below when shooting pictures.

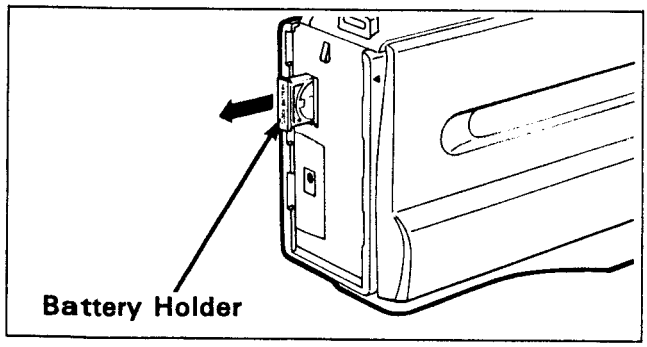
NOTE: Power is not turned on for shooting unless the viewfinder is set to this position.



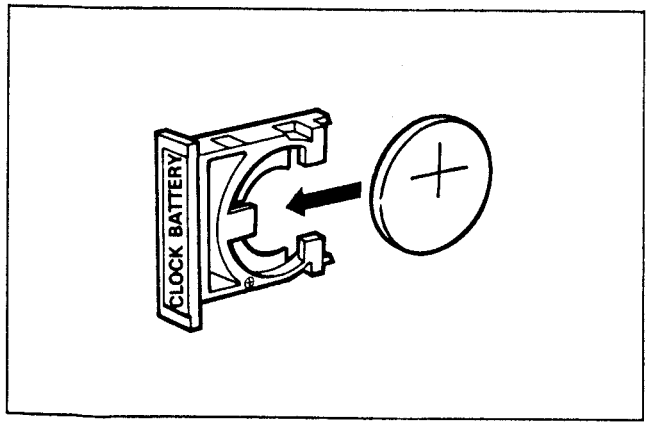
LOADING BATTERY FOR DATE/TIME

You may want to install the date/time battery (Accessory No. 4) immediately to prevent misplacing it.

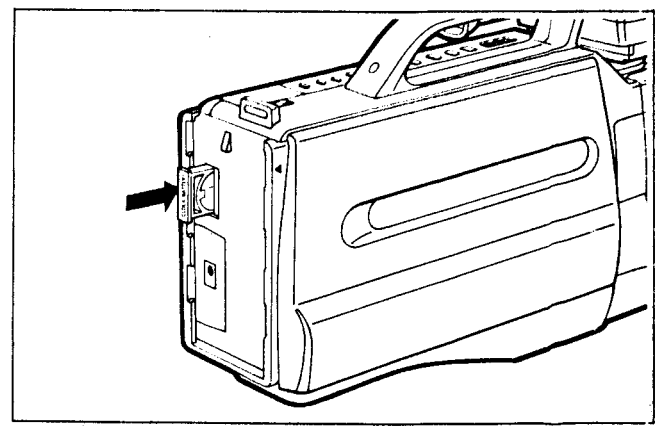
1. Pull the battery holder with coin etc.



2. Insert the date/time battery with the "+" terminal facing out.



3. Fully insert the battery holder into the camera/recorder.



NOTES:

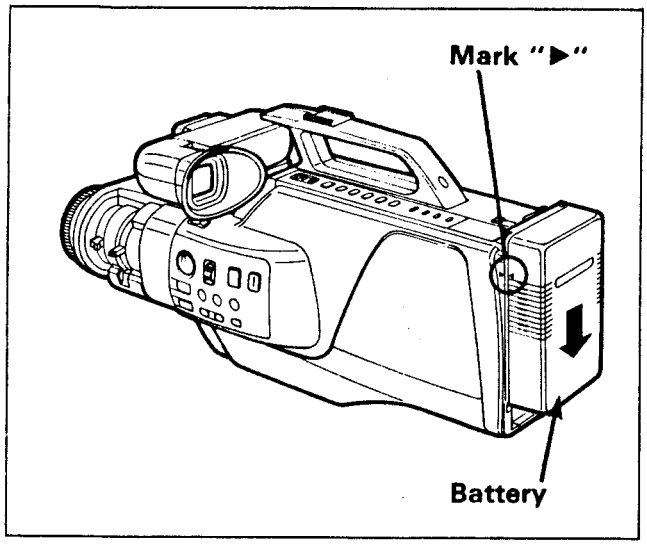
- When replacing the batteries, use 3V micro lithium cell such as Maxell CR2025 or equivalent.
- Instructions for setting the time and date are on page 22. You can do that later if desired after you're more familiar with your camera/recorder.
- Dispose of battery safely and in accordance with local laws.
- Do not dispose of in fire.

WARNING:
Keep this battery away from children. If swallowed, consult a physician immediately for emergency treatment.

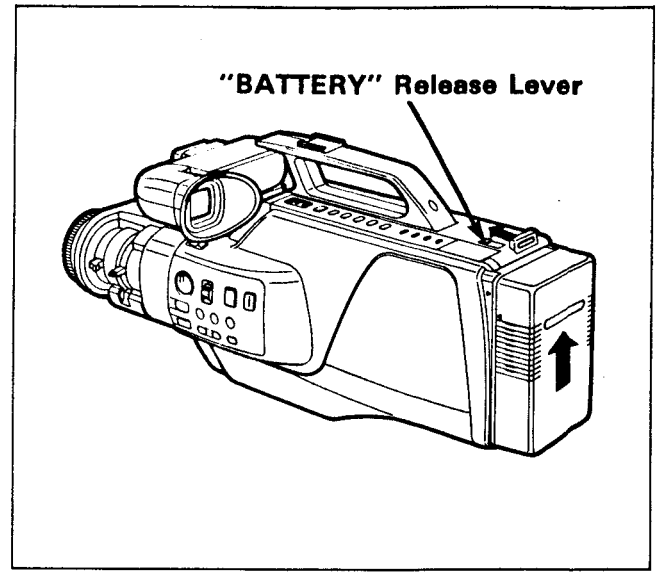
POWER SOURCES

■ WHEN USING WITH THE BATTERY (Accessory No. 2)

- To attach, align the mark "▶" of the battery with that of the camera/recorder so that the battery fits into the grooves, and slide the battery downward, as illustrated.

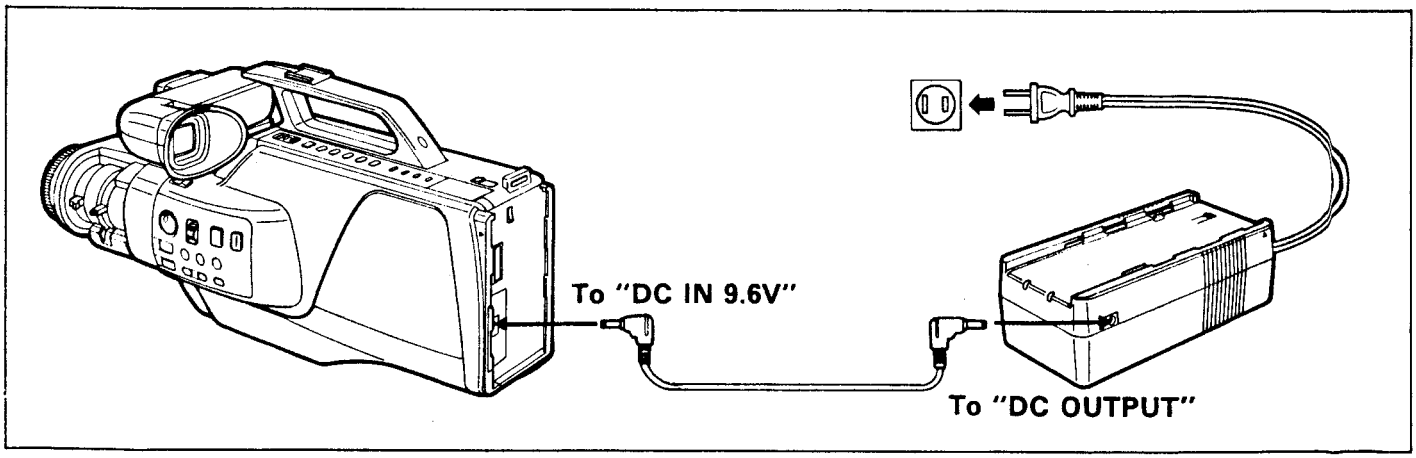


- To remove the battery:
  Push and hold "**BATTERY**" release lever, then slide the battery to the upside and remove.



■ WHEN USING WITH THE AC ADAPTOR/CHARGER (Accessory No. 3)

See the rating label of the AC adaptor/charger.

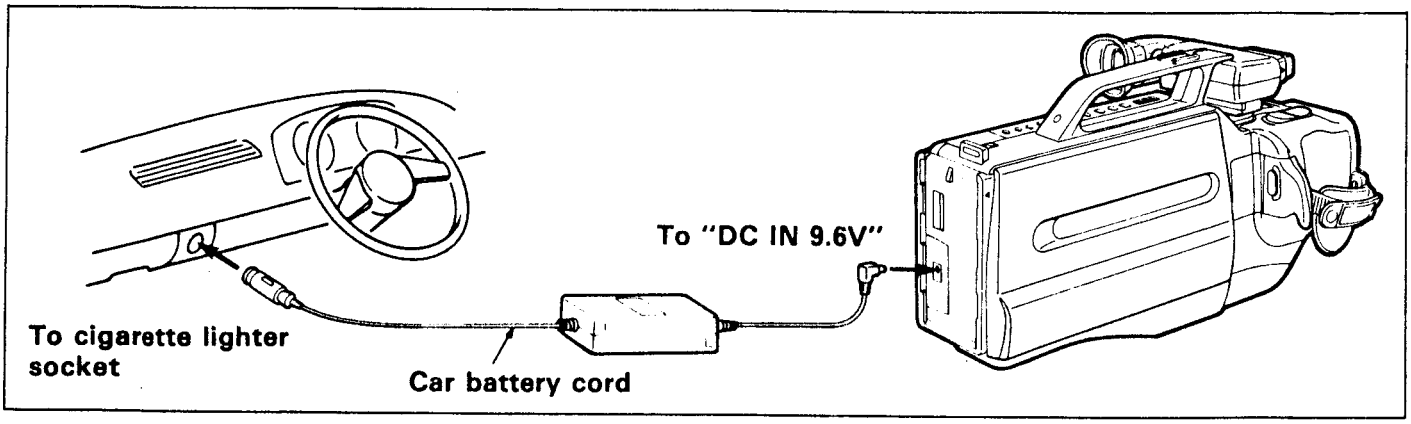


1. Plug the AC adaptor/charger power cord into AC electrical outlet.
2. Connect one end of the DC cord (Accessory No. 6) to the "**DC IN 9.6V**" jack of the camera/recorder. Connect the other end of the DC cord to the "**DC OUTPUT**" of the AC adaptor/charger.

NOTES:

- The AC adaptor/charger cannot charge the battery and operate the camera/recorder at the same time.
- When using the AC adaptor/charger to power the camera/recorder, the battery level indicator may display " ▭ ". This indicator is used for battery operation and has no meaning when using the AC adaptor/charger to power the camera/recorder.

■ **WHEN USING WITH THE CAR BATTERY (By using optional car battery cord Hitachi VM-CC70A)**



1. Connect the small plug of the car battery cord to the **"DC IN 9.6V"** jack of the camera/recorder.
2. Connect the other end of the car battery cord to the car's cigarette lighter socket.

NOTES:

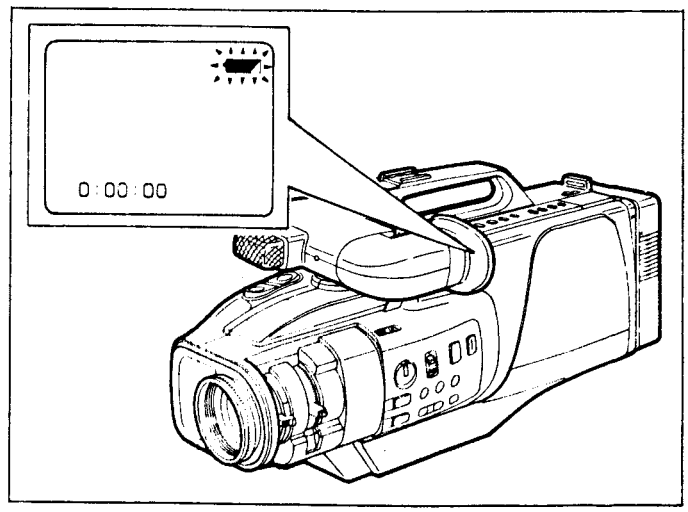
- The car battery cord is designed to be used only with automobiles having a 12-volt negative ground system.
- To prevent fire or shock hazard or damage to your camera/recorder, please use only with Hitachi's car battery cord model VM-CC70A.

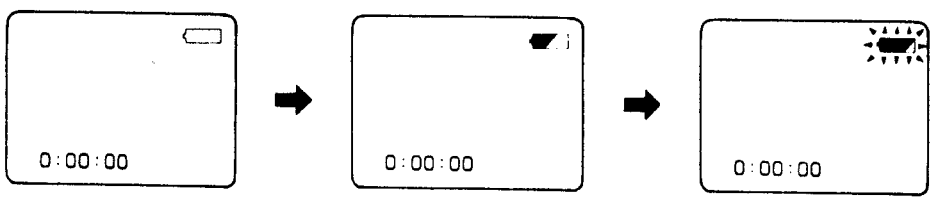
CHECKING THE BATTERY

When the " ▬ " indication appears in the viewfinder and flashes while the camera/recorder is being operated with a battery (Accessory No. 2), it indicates that the battery charge is low. Charge it or replace it with a charged battery.

NOTE: Whenever the linear time counter or time remaining display is present in the viewfinder, the battery level indicator " ▭ " is displayed in the viewfinder indicating the condition of camera/recorder battery power. When the battery is fully charged, " ▭ " is displayed.

After several minutes, the symbol will change to " ▬ ". When the battery is very near empty, the symbol will change to " ▬ " and start blinking. You should find an alternative power source or recharge the battery before continuing to use your camera/recorder.

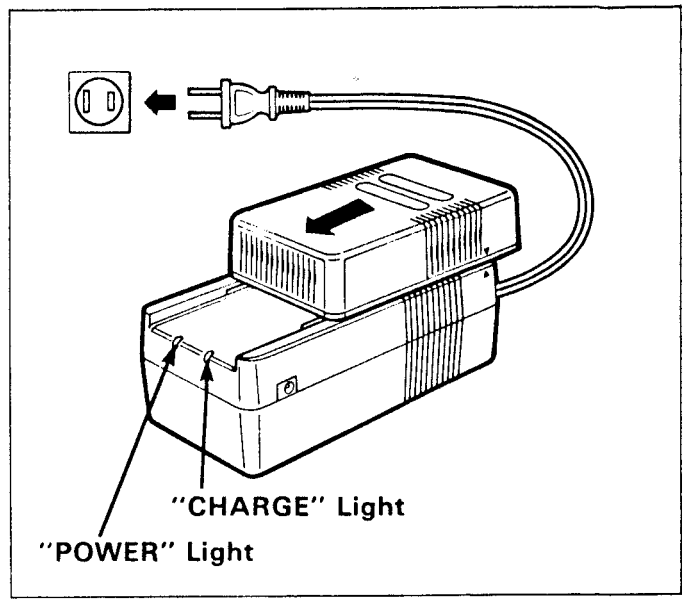




CHARGING THE BATTERY

1. Plug the AC adaptor/charger power cord into AC electrical outlet.
2. Attach the battery to the AC adaptor/charger. Align the reference arrow on the battery with that of AC adaptor/charger and push the battery flush with the AC adaptor/charger and slide it in the direction of arrow.

   NOTE: You must remove the DC cord from the AC adaptor/charger to charge the battery. If the DC cord is connected, **"CHARGE"** light will not light.
3. The **"CHARGE"** light will be lit while the battery is accepting a charge, and will go out when the battery is fully charged.



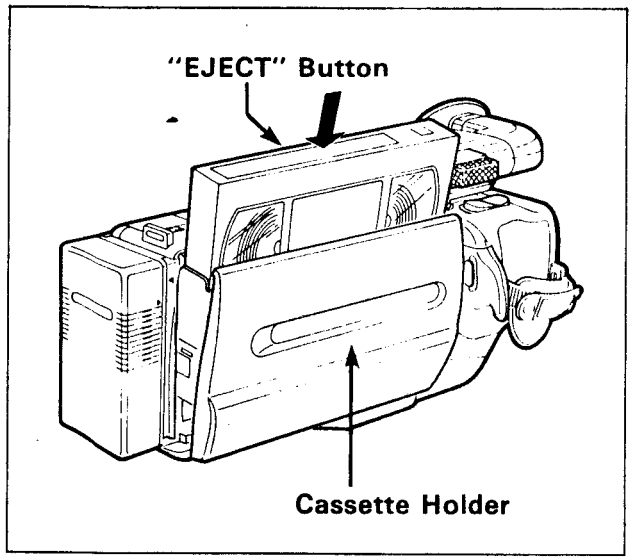
NOTES:

1. The time required for charging the battery is approx. two hours for VM-BP66 (Optional) and three hours for VM-BP67 (Provided).
2. When fully charged, the battery should supply approx. 90 ~ 120 minutes of operating time for VM-BP67 (45 — 60 minutes for VM-BP66) (depending on how much you use zoom and pause).
3. Charge the battery after use and store it at normal room temperature.
4. Recharge your battery at least once every six months. The battery is a lead-acid battery. This battery tends to discharge if not used for an extended period of time. If the battery is stored for a extended length of time without being recharged, you may not be able to recharge it.
5. A battery charged after being stored for a long period may not supply power for the specified time. Additional rechargings will help restore the battery's operation time.
6. The battery should be charged at a temperature of 32°F — 95°F (0°C — 35°C) to prevent damage.
7. Do not operate the battery at temperatures below 14°F (—10°C) or above 95°F (35°C). The battery may be damaged if operated at temperatures above 122°F (50°C). Operation time will decrease at extremely low temperatures.
8. After repeated chargings and use, the operation time will gradually decrease. When operation time becomes too short to be useful, it is time to replace the battery.
9. If **"CHARGE"** and **"POWER"** lights on the AC adaptor/charger start flashing, remove the battery and then reattach it. If after several attempts both lights continue to flash, this means your battery cannot take a charge and must be replaced with a new one.
   The **"CHARGE"** light will not light if a hot battery is attached to the AC adaptor/charger. Attaching an extremely hot battery to the AC adaptor/charger is not recommended; it should be allowed to cool down before being attached.
10. Do not short the battery's terminal.
11. Do not attempt to disassemble or modify the battery. There are no user serviceable parts inside.
12. Throwing the battery into a fire or exposing the battery to excessive heat — over 149°F (65°C) could be hazardous.

MAKING A SAMPLE CAMERA RECORDING

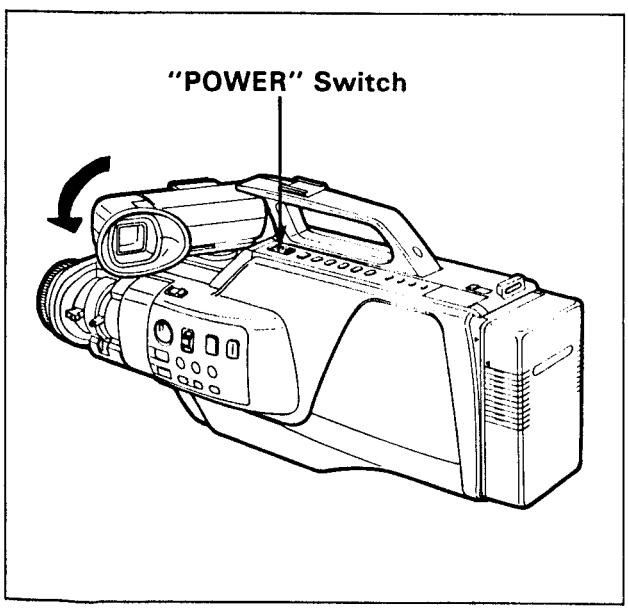
1. Connect the POWER SOURCE. (See pages 9 and 10.)
2. Press **"EJECT"** button and insert the cassette so the transparent window is toward you and the arrow toward the cassette holder. Slide the cassette into cassette holder as far as it will go.

   NOTE: Push in the center of the cassette all the way until it is latched by the cassette holder.
3. Press the cassette holder. The holder will latch in the operating position.



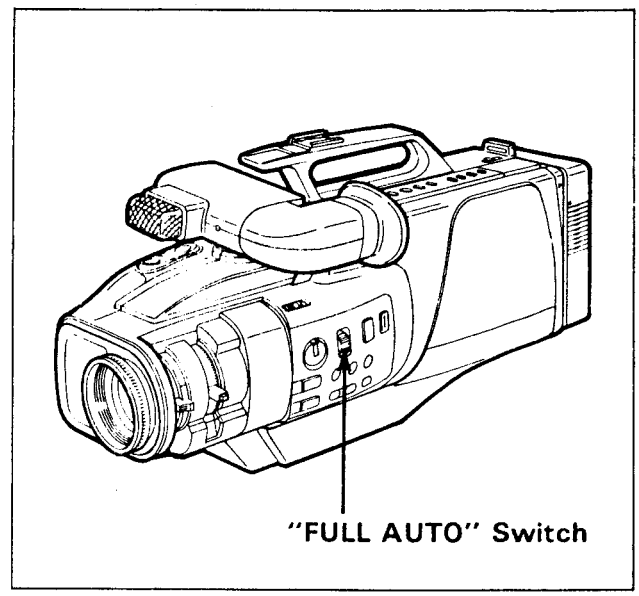
4. Press and hold the small button on **"POWER"** switch, and then slide it to the **"CAM"** position.
5. Rotate the electronic viewfinder into the operating position. The **"POWER"** indicator will light and the camera/recorder will enter record/pause mode automatically.

   NOTE: If the erase prevention tab on the cassette is removed, the **"TAPE"** indication in the viewfinder flashes for several seconds and the camera/recorder will not enter record/pause mode.



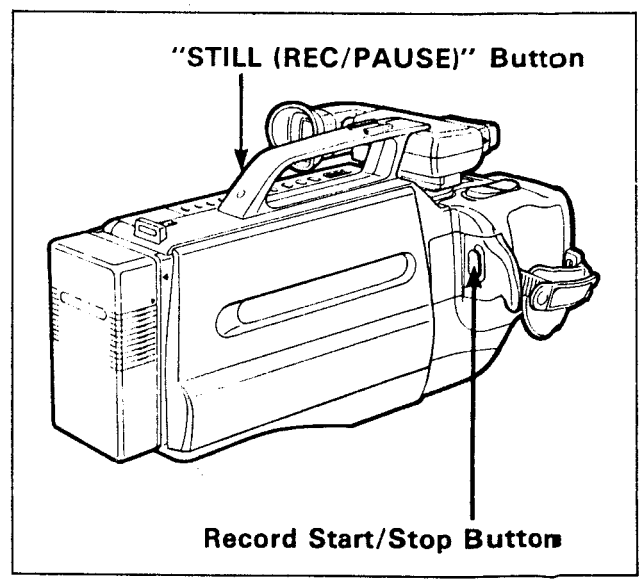
6. Set **"FULL AUTO"** switch to **"AUTO"**.

   NOTE: See page 32 for **"EYEPIECE ADJUSTMENT"**.

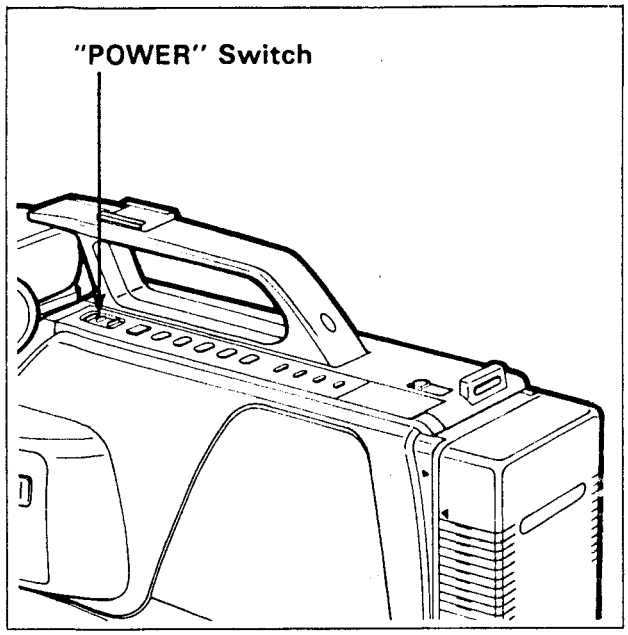


7. Now, press record start/stop or **"STILL (REC/PAUSE)"** button to start shooting the picture. The **"REC"** indication appears in the viewfinder and you are now recording the picture you see through the viewfinder.
8. Press record start/stop or **"STILL (REC/PAUSE)"** button to stop recording. Press the button again to resume recording. The **"PAUSE"** indication will appear in the viewfinder instead of **"REC"** while the camera/recorder is in the record/pause (standby) mode.

   NOTE: The **"TAPE END"** indication starts flashing in the viewfinder when there is less than three minutes recording time left on the cassette.

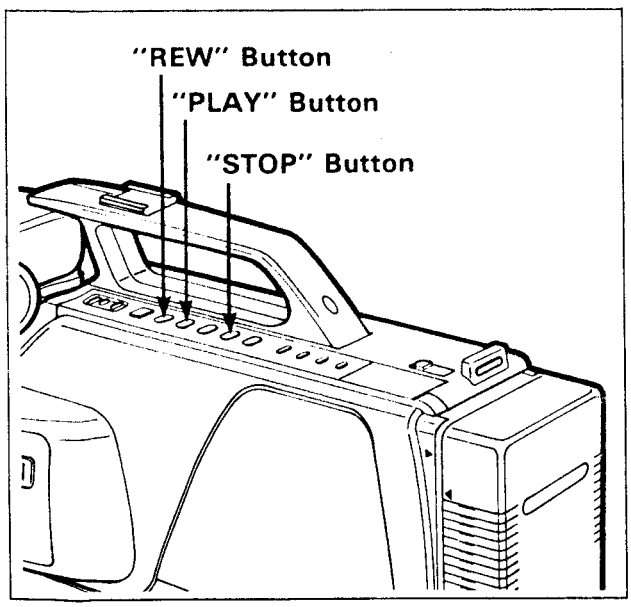


9. After recording, press and hold the small button on the **"POWER"** switch, and then slide it to **"VCR"**. The camera/recorder will be now in the stop mode.

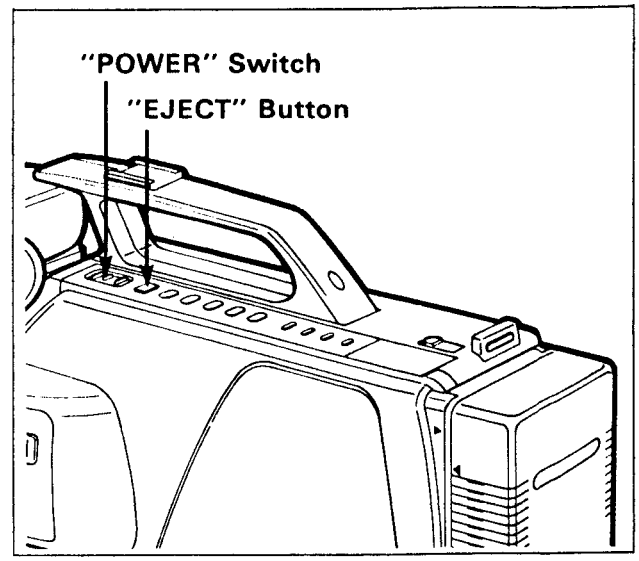


10. Press **"REW"** button. The tape will be rewound to the beginning.
11. Press **"PLAY"** button. The picture you just recorded will be seen through the viewfinder and sound can be heard by earphone (Not supplied).

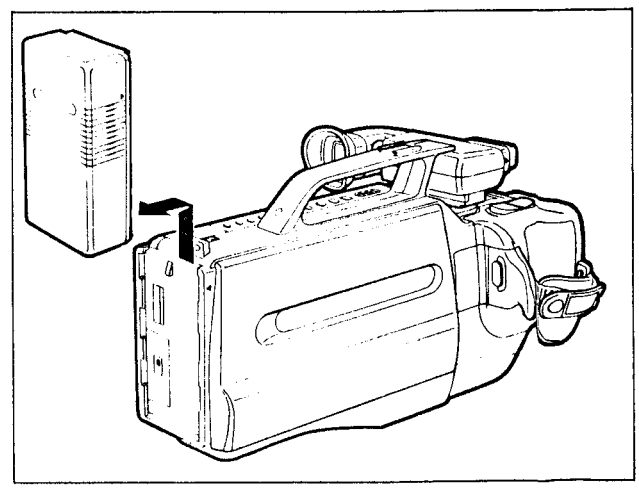
    NOTE: If you connect the camera/recorder to your TV, you can see the picture played back on your TV. Refer to **"VIEWING THE PICTURE PLAYED BACK ON YOUR TV"** on page 38.
12. After playing, press **"STOP"** button.



13. Press and hold the small button on the **"POWER"** switch, and then place it in **"OFF"** position to turn off the camera/recorder. Press **"EJECT"** button to remove cassette.



14. Always remove the power source from the camera/recorder after use.



NOTE: If you have a cassette tape that has already been partially recorded on and you want to record the remaining blank section, see **"QUICK EDIT"** on page 27 and **"BLANK SEARCH"** on page 29.

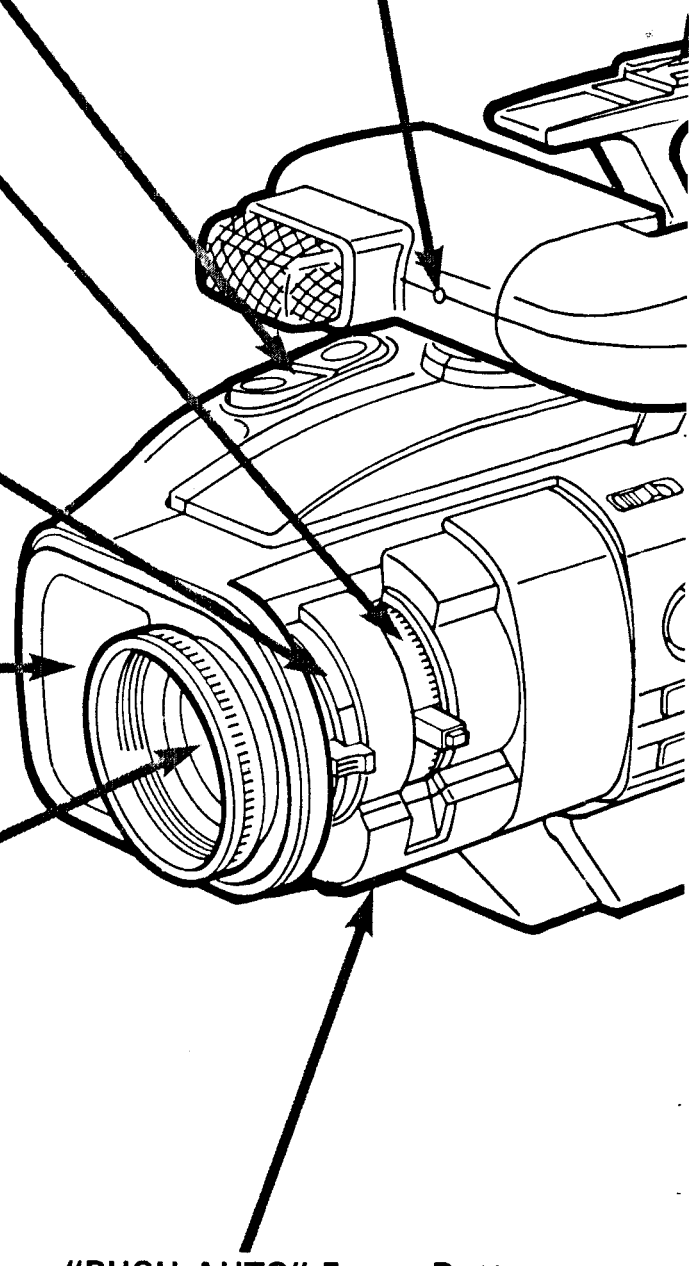
IDENTIFICATION AND OPERATION OF CONTROLS

Power Zoom Switch
This switch performs zooming electrically.

"W": Picture becomes wider gradually.
"T": Picture becomes telescopic gradually.

Record Indicator
This indicator lights up to indicate that the camera/recorder is recording. During self timer operation, this light flashes to indicate recording is about to begin then stays on to indicate recording has started.

Zoom Ring (Manual Zooming)
The picture size can be magnified 8 times with the use of the zoom feature. Just rotate the zoom ring for a close up (T) or wide angle (W) picture. Macro close-up, as close as 1 cm from object, is feasible.



Focus Ring
Used to achieve manual focus.
Do not attempt to manually turn the focus ring when the camera/recorder is in the auto focus mode.

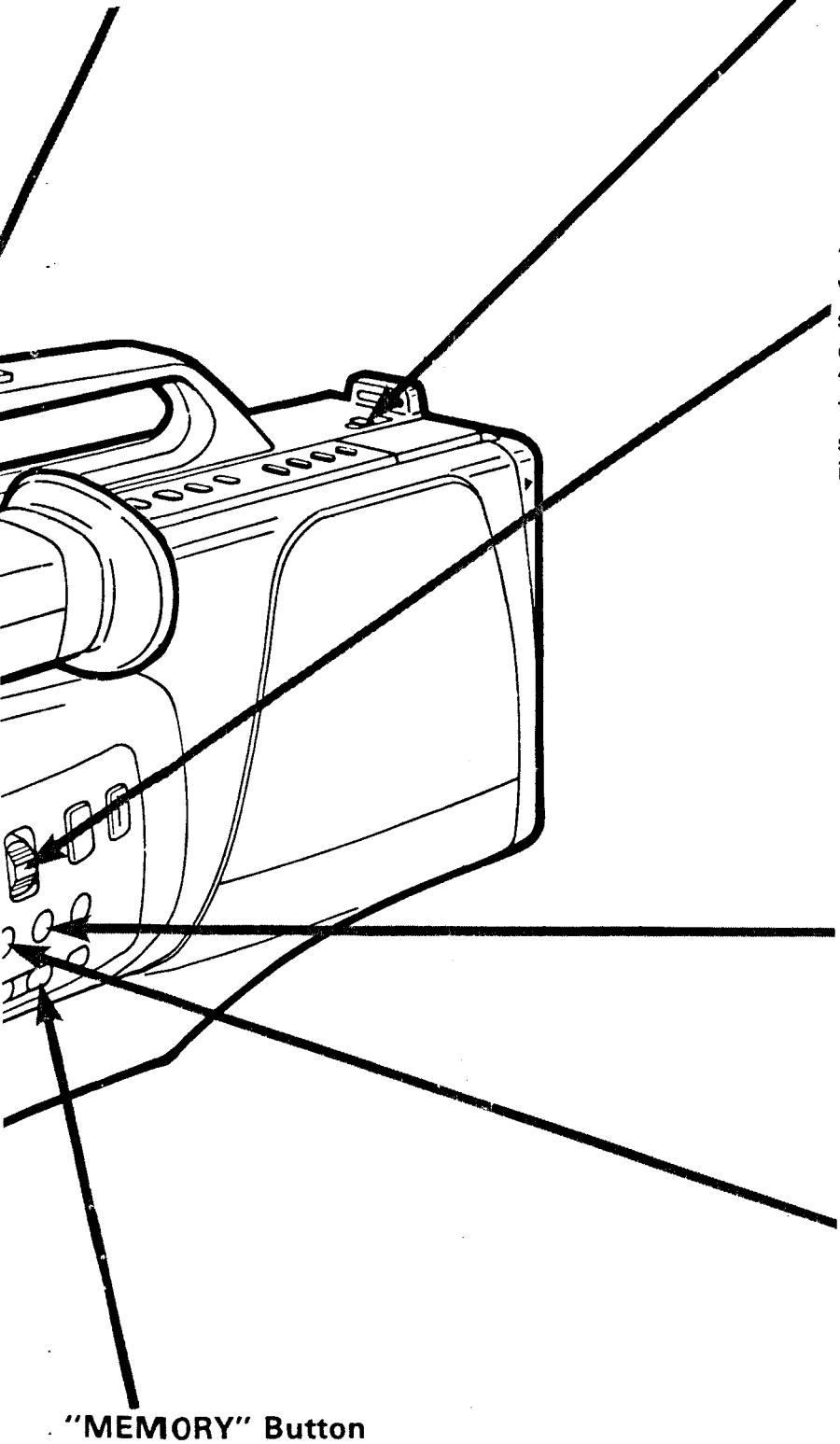
Auto Focus Window/Infrared Ray Receiver
To automatically focus the camera lens, this window transmits and receives infrared light which is reflected off the object. Make sure you don't obstruct this window when recording.
The window also receives infrared rays from remote control unit (provided).

Lens
F1.4 (6.2 ~ 50 mm) 8:1 power zoom lens features auto focus and auto iris functions.

"PUSH AUTO" Focus Button
Auto focusing can be also performed during manual focus mode by pushing this button.

Accessory Shoe
Used to attach the DC camera light (Accessory No. 7).

"BATTERY" Release Lever
Releases the battery attached to the video camera/recorder.



"FULL AUTO" Switch
When this switch is set to "**AUTO**", the focus, shutter speed and iris are adjusted automatically. Also NEG/POS operation is set to "**POS**" automatically.
To adjust these functions manually, set this switch to "**MAN**" and adjust the corresponding buttons and switches.

"DISPLAY" Button
Pressing this button once causes a 5 digit linear time counter and battery indicator to appear in the camera/recorder's viewfinder. Pressing the button again will cause battery indicator and the amount of time remaining on the cassette in the camera/recorder.
Press a 3rd time to delete all displays.

"SHUTTER" Button
Used to control the shutter speed during recording and/or record/pause (stand-by) mode. (See "**VARIALE SHUTTER SPEED**" on page 28.)

"MEMORY" Button
If this button is pressed while the linear time counter or time remaining read-out is displayed in the viewfinder, "**M**" appears in the display and it memorizes the tape position of "**0:00:00**". (See page 40.)

Cover for DC camera Light Terminal

When the DC camera light is attached to the accessory shoe, this cover slides and power can be supplied to the DC camera light.

Caution: To help avoid any potential hazard from electric shock, do not open this cover when the DC camera light is not attached and the camera/recorder is turned on.

Electronic Viewfinder (EVF)

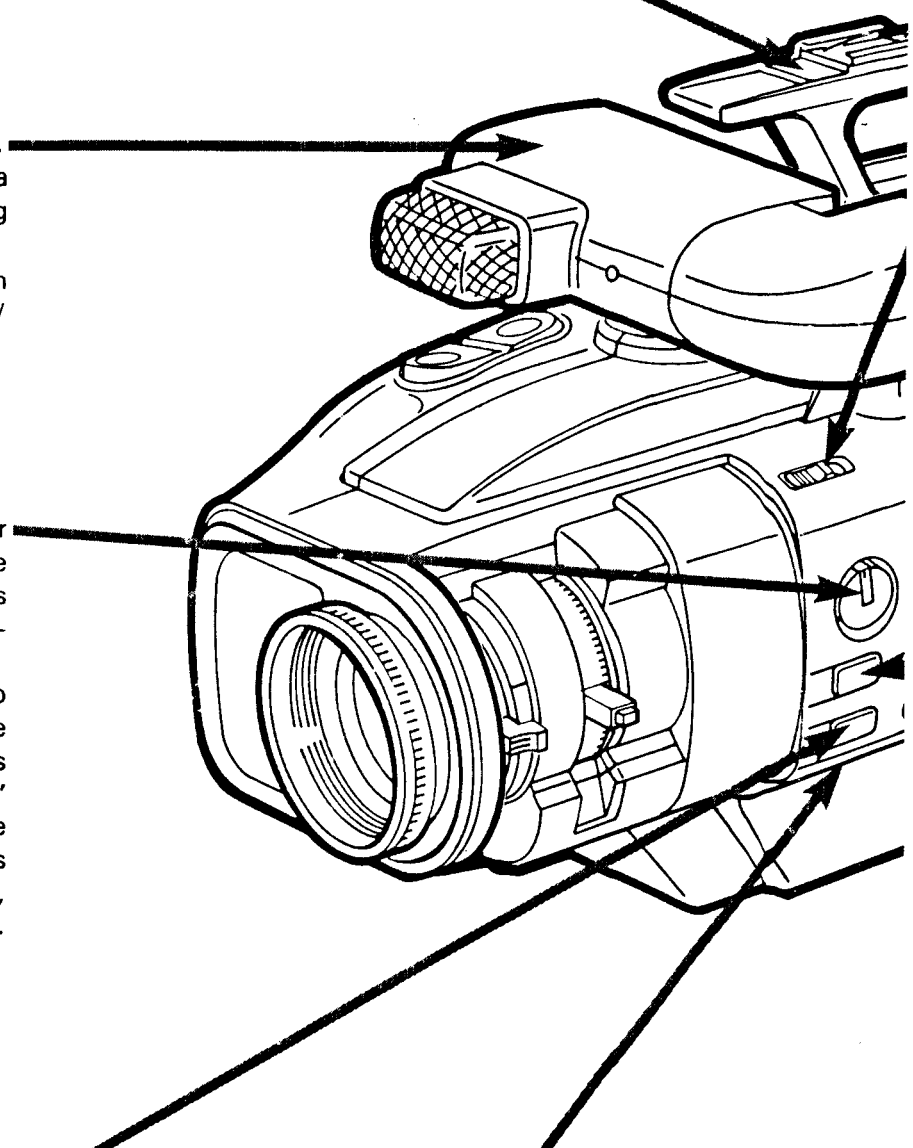
Displays what the camera/recorder lens sees. The electronic viewfinder also functions as a convenient black-and-white monitor during playback of recorded material.

NOTE: The electronic viewfinder must be in the operting position before the camera/recorder will record.

"IRIS" Control

With this control in the center click position or **"FULL AUTO"** switch is set to **"AUTO"**, the camera/recorder automatically adjusts the lens opening for the best picture in normal conditions.

The auto iris system can also be adjusted to compensate for unusual lighting. When the subject is in bright light and the background is dark, set **"FULL AUTO"** switch to **"MAN"** and turn this control counterclockwise to close the lens iris opening. When the background is in bright light and the subject appears too dark, turn the control clockwise to open the lens iris.



"FADE" Button

During recording you can add a professional touch to your recordings by fading in and out of scenes.

NOTE: When you use **"FADE"** button to fade in and out, the sound will also fade in and out with the picture.

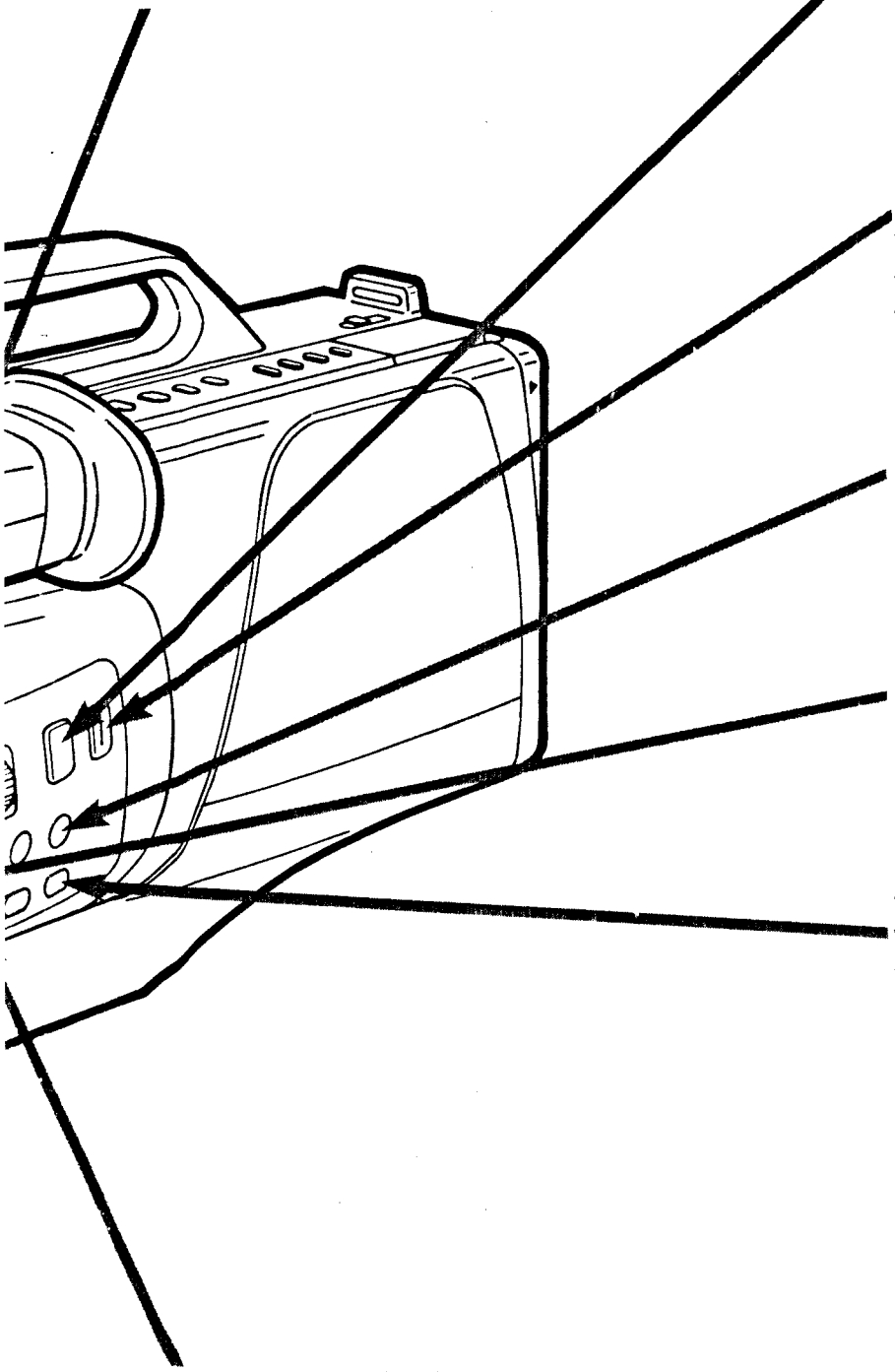
"NEG/POS" Switch

- Normally set to **"POS"**.
- Set to **"NEG"** for special effects as in a negative film.

NOTE: When **"FULL AUTO"** switch is set to **"AUTO"**, **"NEG/POS"** operation is set to **"POS"** automatically.

"TIME LAPSE/SELF TIMER" Switch

This switch allows time lapse, one shot and self timer recording. See page 31.



"TITLE" Button

Press this button to create and record personalized titles on your videos with the camera/recorder's built-in titler.
(See **"TITLE RECORDING"** on page 34.)

"ZOOM MODE" Button

Use this button to switch the digital zoom feature. Usually press this button so that **"ZM:1"** appears in the viewfinder. (See **"DIGITAL ZOOM"** on page 26.)

"DATE/TIME" Button

Press this button to display the date and time in the viewfinder.
Whenever the date and time appear in the viewfinder, they will be recorded on the tape.

"REVIEW" Button

Used to review the last few seconds of the recorded segment in the record/pause mode.

"INDEX" Button

When this button is pressed during a recording, the camera/recorder records an invisible index mark on the tape.
This is useful later when the tape is played back in your camera/recorder or a VCR that features the indexing system called **"VHS Index Search System"** because you will be able to quickly locate each index mark.

"RESET/T-160/T-180" Button

When the linear time counter is displayed in the viewfinder, pressing this button resets the counter to **"0:00:00"**.
When the time-remaining read-out is displayed, pressing this button changes the display for extended length T-160 or T-180 tape. **"T-160"** or **"T-180"** will appear in the viewfinder.

"POWER" Switch

This switch changes the camera/recorder to the record mode or to the playback mode. Press and hold the small button on this switch, and then slide it to **"CAM"**, **"OFF"** or **"VCR"**. The electronic viewfinder must be in the operating position before the camera/recorder will record.

"EJECT" Button

Operates with **"POWER"** either on or off, if a power source is connected to the camera/recorder.

"POWER"/Dew Indicator Light

Flashing of the light indicates dew condensation on camera/recorder mechanism. While this light is flashing, the unit will not operate. If this occurs, eject the tape and leave the power on. When the light stops flashing, the unit can be operated.

"REW" Button

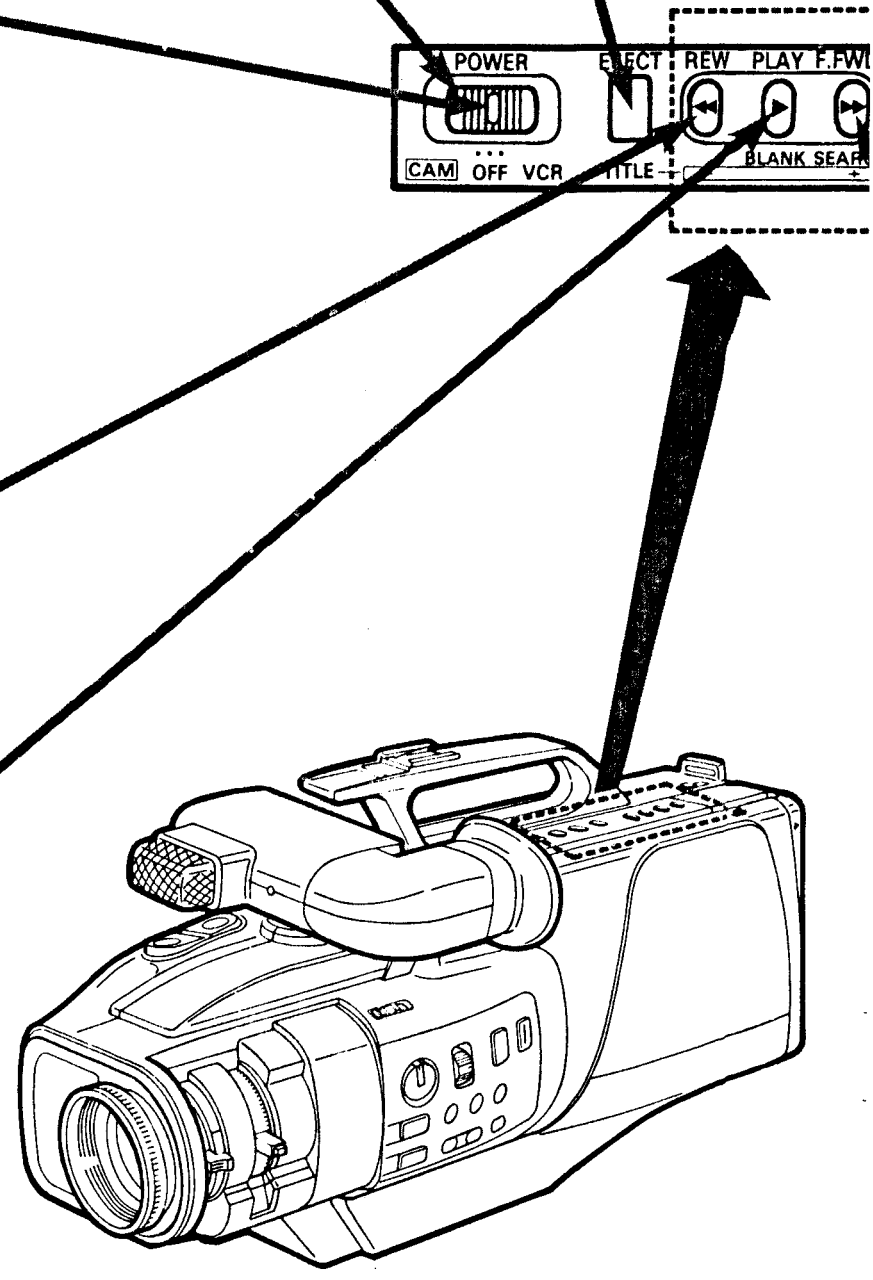
Press this button during stop or fast forward mode, and fast-rewinding starts. **"REWIND"** indication appears in the viewfinder whenever the tape counter or time remaining is present. Press the button during playback of tape, and the tape is played back in the rewind direction approximately 3 times faster than the normal speed to confirm the recorded contents. Press **"PLAY"** button to return to normal playback mode or press **"STOP"** button to stop tape movement.

NOTE: You can also visually scan backward when the camera/recorder is in the record/pause (stand-by) mode by pressing and holding this button.

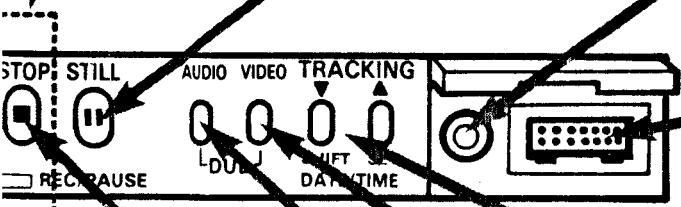
"PLAY" Button

Used for playback of tape recorded in the SP mode.

NOTE: When the camera/recorder is in the record/pause (stand-by) mode, pressing and holding this button will play the tape at normal speed.



These buttons are used for title making buttons when the "**TITLE**" button is pressed. (See "**TITLE RECORDING**" on page 34.)



"STILL (REC/PAUSE)" Button

When this button is pressed during recording, the tape stops and the camera/recorder enters the record/pause (stand-by) mode. When this button is pressed again, the tape begins recording. This button may be also used to display a still picture during playback mode.

"EAR"phone Jack

Sound being recorded by the microphone or played back may be monitored by attaching earphone (Not supplied) to this jack.

"AV OUT" Jack

Connect the video/audio output cord (Accessory No. 1) to this jack and to the audio and video inputs of your TV/monitor receiver. You may also connect the RF converter unit to this jack and your TV receiver.

"TRACKING" Buttons

Used when playing a tape recorded on another VCR. Adjust for best picture. Ejecting the cassette returns the tracking to the normal position. These Buttons may be also used to set the date and clock during pause (stand-by) mode. (See "**DATE/TIME SETTING**" on page 22.)

"VIDEO DUB" Button

This button is used to record new video in place of existing video without erasing the audio. See page 37.

"AUDIO DUB" Button

This button is used to record new audio in place of existing audio without erasing the video. See page 36.

"STOP" Button

The "**STOP**" button is used to stop playback, rewind, and fast forward operations. The "**STOP**" button has no effect during record operation.

"F.FWD" Button

Press this button during stop or rewind mode, and fast-forwarding starts. "**FAST FWD**" indication appears in the viewfinder whenever the tape counter or time remaining is present.
Press the button during playback of tape, and the tape is played back in the forward direction approximately 3 times faster than the normal speed to confirm the recorded content.
Press "**PLAY**" button to return to normal playback mode or press "**STOP**" button to stop tape movement.

NOTE: You can also visually scan forward when the camera/recorder is in the record/pause (stand-by) mode by pressing and holding this button.

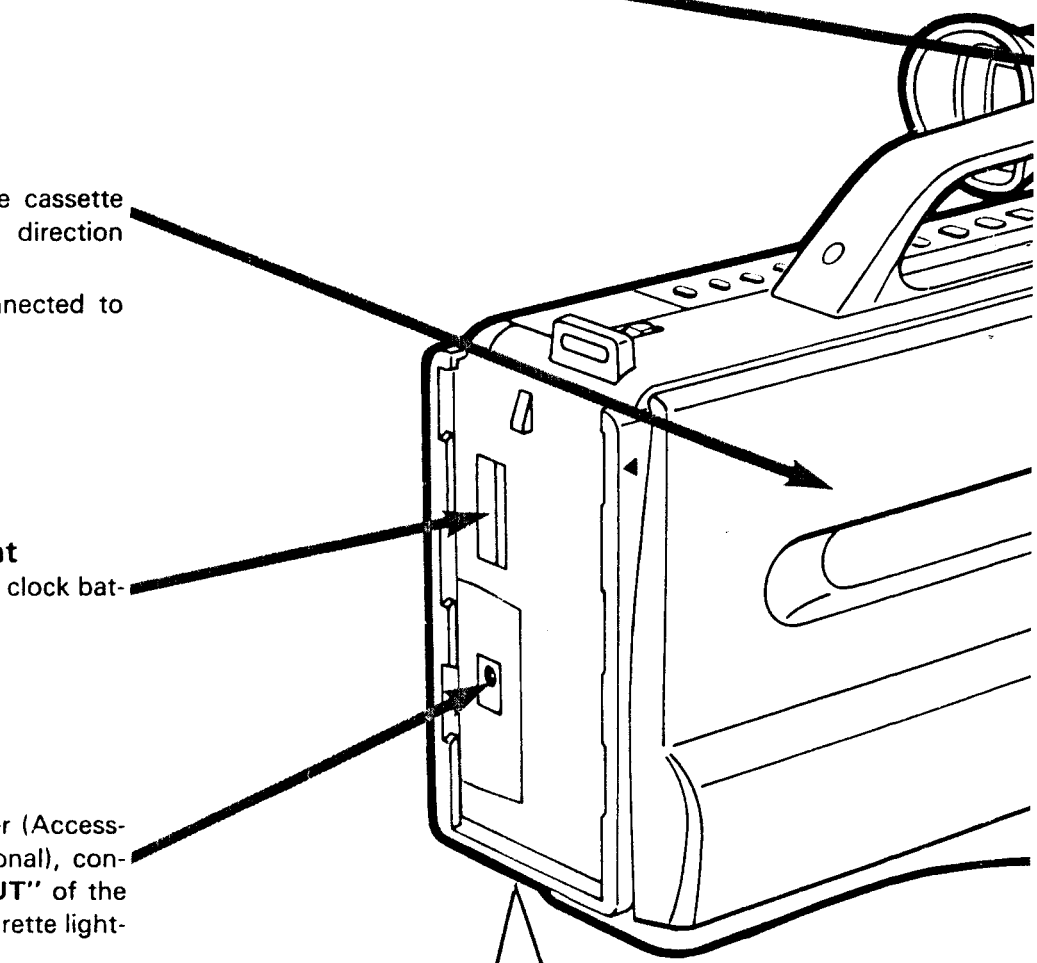
Diopter Control
To use the electronic viewfinder without eyeglasses on, turn this control knob for your optimum focus adjustment.

Cassette Holder
Press **"EJECT"** button to open the cassette holder. Be aware of the cassette direction when inserting.

NOTE: Power source must be connected to open the cassette holder.

Clock Battery Compartment
Pull the battery holder and install the clock battery (provided).

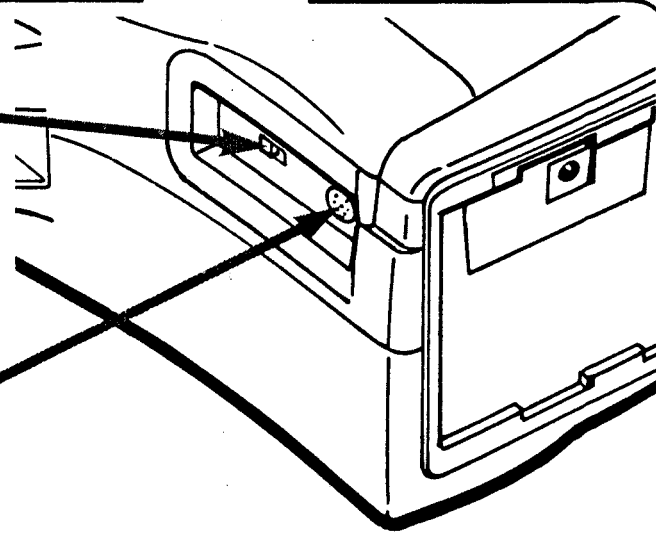
"DC IN 9.6V" Jack
When using the AC adaptor/charger (Accessory No. 3) or car battery cord (optional), connect this jack and the **"DC OUTPUT"** of the AC adaptor/charger or the car's cigarette lighter socket.

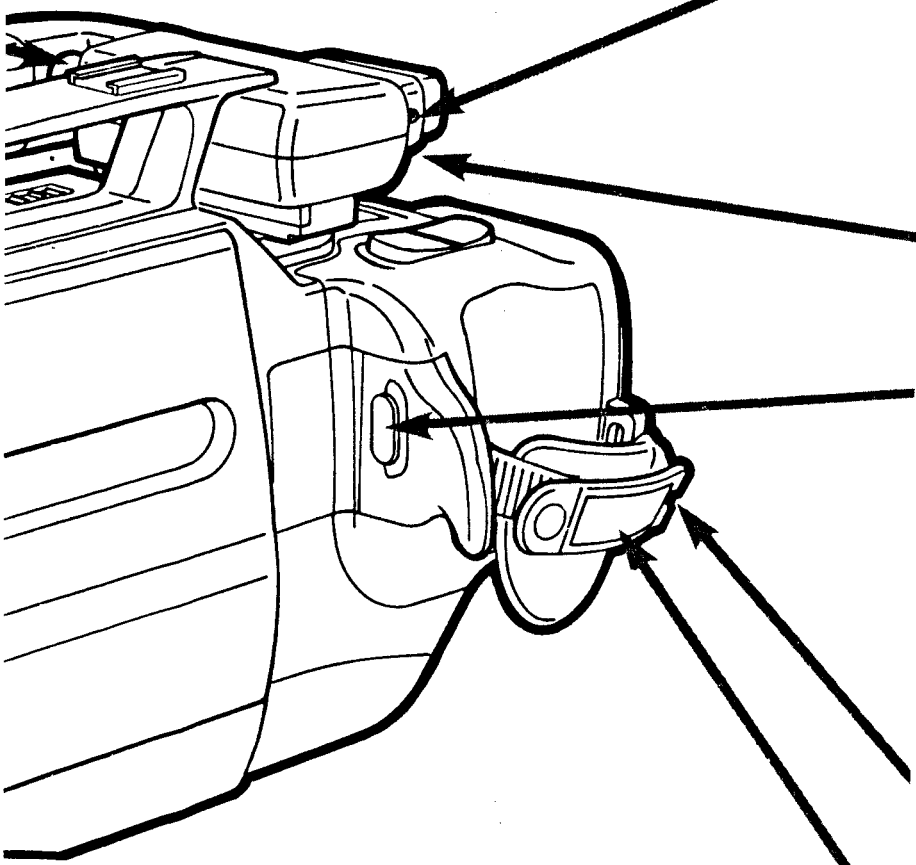


"MIC MIX (ON/OFF)" Switch
This switch lets you add additional comments (or music) to a tape while you are copying a tape from your camera/recorder onto another VCR.

"AV IN" Jack
Use this connector jack when you want to send signals from another device into your camera/recorder for recording.

NOTE: Do not lose the cap.





"MIC" Jack

Connect an external microphone (Not supplied) here to record sound from the external microphone.

NOTE: Connecting an external microphone automatically switches off the built-in microphone.

"MIC WIND/NORM" Switch

This switch is used to reduce noise that occurs due to wind. **Place the switch in the NORMAL position for normal use.**

Record Start/Stop Button

This button is used to control the camera/recorder. When **"POWER"** switch is set to **"CAM"** position, pressing this button starts the tape to begin recording. **"REC"** appears in the viewfinder.

When this button is pressed again, **"PAUSE"** appears instead of **"REC"** and the tape stops and the camera/recorder enters the record/pause (stand-by) mode.

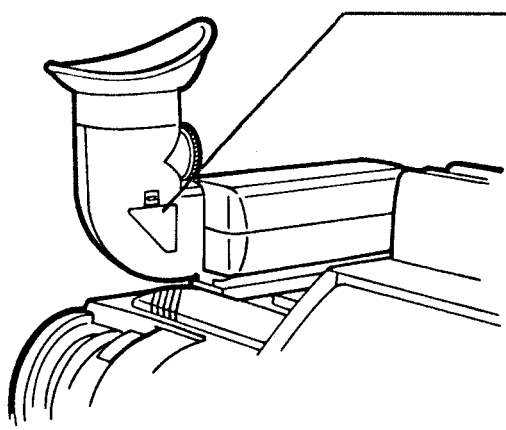
Lens Cap Tab

Place the lens cap on this tab when you are ready to record a scene. The tab also prevents the lens cap from swinging around on its cord.

Hand Strap

Adjust to best fit to your hand.

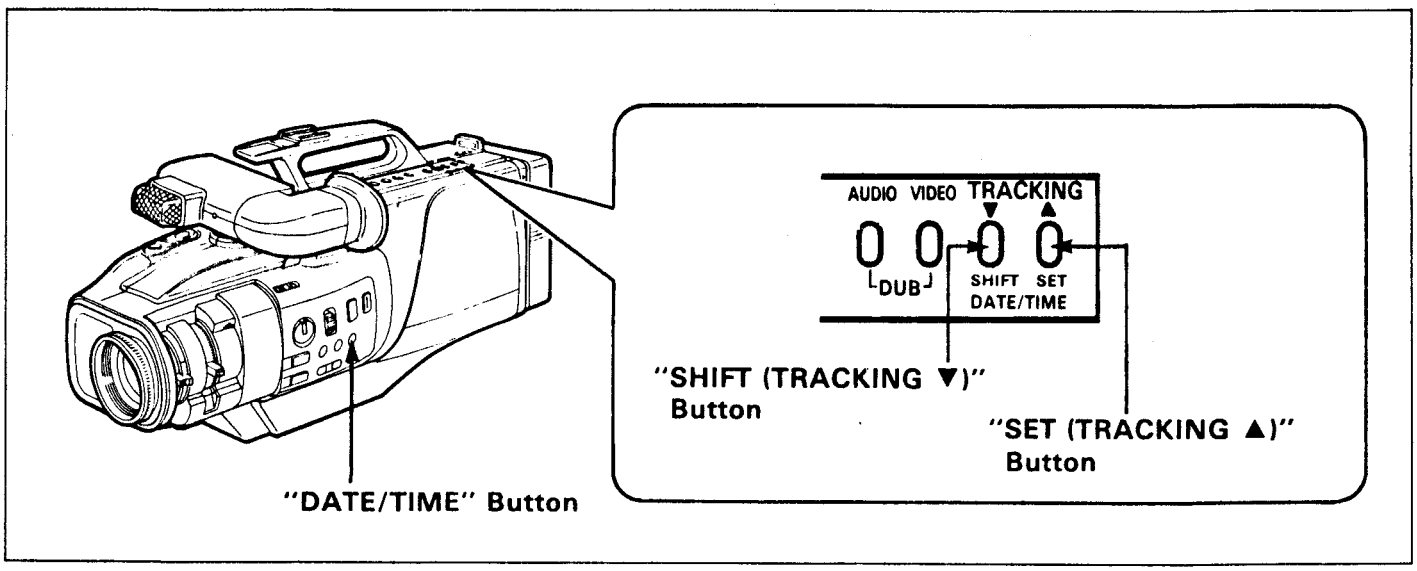
■ **Service Access Door**



Open to clean picture tube face, mirror and lens. To prevent scratching, use a soft non abrasive cloth, swab or lens cleaning paper.

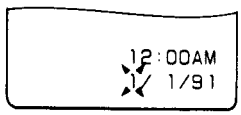
DATE/TIME SETTING

The date and time can be recorded on your tapes to act as a handy reference when viewing them at a later time. Since camera/recorder has a dual time feature, if you go abroad to a country with a time difference, you can also record the time at the site together.
Use the following procedure to set up this display for the current date and time.

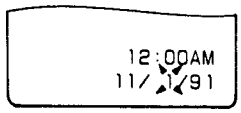


To set the first clock

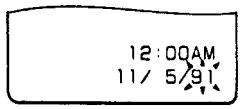
1. Load the camera/recorder's date/time battery as described on page 8.
2. Press and hold the small button on **"POWER"** switch, and then slide it to **"CAM"** position.
3. Rotate the electronic viewfinder into the operating position. The **"POWER"** indicator will light.
4. Press **"DATE/TIME"** button.
   Date and time appear in the viewfinder and **"1"** flashes.



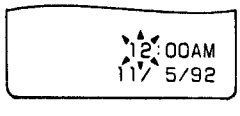
5. Press **"SET"** button to select correct month. Hold button down to advance rapidly. When the correct month appears, press **"SHIFT"** button.



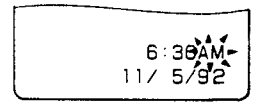
6. Press **"SET"** button to select correct date. Hold button down to advance rapidly. When the correct date appears, press **"SHIFT"** button.



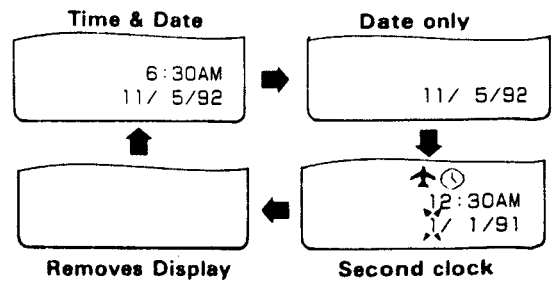
7. Press **"SET"** button to select year, and then press **"SHIFT"** button.



8. Press **"SET"** button as many times as may be required to select correct hour, and then press **"SHIFT"** button.
9. Repeat steps 8 to select minute and AM/PM.



10. After setting AM or PM, press **"SHIFT"** button again to erase the flashing cursor and start the internal clock.
11. Press **"DATE/TIME"** button after setting the clock. The display will change as follows each time the button is pressed.



NOTE:

- See the next page for setting the second clock.
- The date/time graphics will be recorded whenever they appear in the viewfinder.

■ To correct date/time information during programming

Press **"SHIFT"** button repeatedly until the flashing cursor will be removed from the viewfinder. Then press and hold **"SHIFT"** and **"SET"** buttons at the same time for more than 5 seconds, the month starts flashing. Correct the incorrect digit by using **"SHIFT"** and **"SET"** buttons.

■ To correct date/time information after starting the date/time

Press and hold **"SHIFT"** and **"SET"** buttons at the same time for more than 5 seconds, the month starts flashing. Correct the incorrect digit by using **"SHIFT"** and **"SET"** buttons.

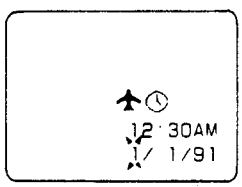
To set the second clock

(The first clock operates even if you do not set the second clock.)

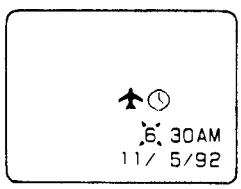
Before setting
Set the first clock first. The second clock cannot be set unless the first clock has been set.

Example
When you go abroad where there is a time difference of minus 5 hours:

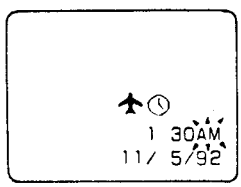
1. Press the **"DATE/TIME"** button to display the second clock.



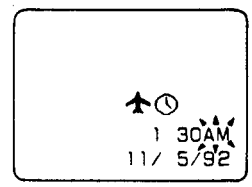
2. Select the month, day, year following the same steps as **"To set the first clock"**.



3. Select the correct hour, and then press **"SHIFT"** button.



4. Select AM/PM.

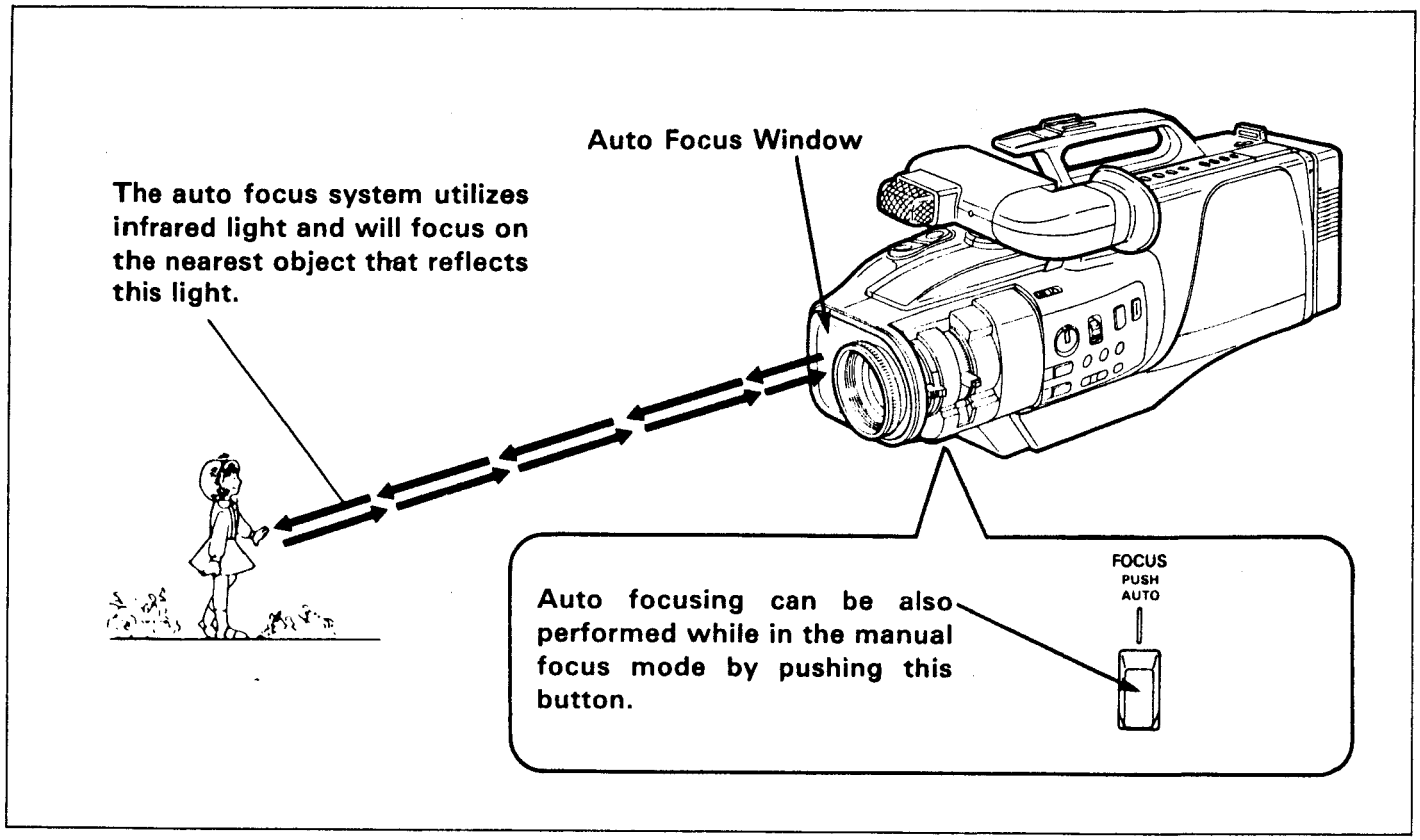


NOTES:
- The minutes of the second clock can not be set. They are the same as those of the first clock.
- The first clock operates even while the second clock is being set.

5. After setting AM or PM, press **"SHIFT"** button to erase the flashing cursor.

NOTES:
- When the date or time of the first clock is flashing, you cannot delete the display.
- When you correct the minutes of the first clock, the minutes of the second clock are corrected automatically.

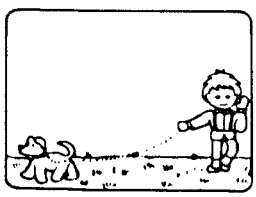
AUTO FOCUS


Auto Focus Window
The auto focus system utilizes infrared light and will focus on the nearest object that reflects this light.
Auto focusing can be also performed while in the manual focus mode by pushing this button.
FOCUS
PUSH
AUTO

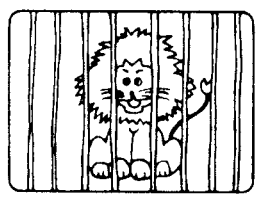
When the "**FULL AUTO**" switch is set to "**AUTO**" position, ordinary objects are automatically in optimum focus.

■ OBJECTS HARD TO AUTO FOCUS

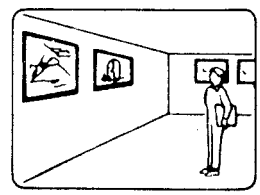
The distance between the auto focus window and the object is measured, and the focus ring is automatically turned for focusing. However, with the scenes such as shown below, the auto focusing may not operate properly, and manual focus should be performed. See next page.



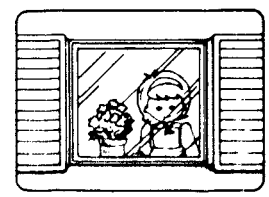
1. Object is not in the center.



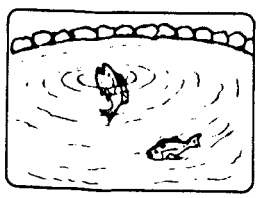
2. Object in far and near positions at the same time.



3. Object with continuous variation from far to near positions.



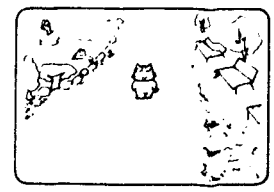
4. Object behind glass.



5. Black object or water which does not reflect infrared light.

6. Object always moving such as a crowd.

7. Object in the snow or fog.



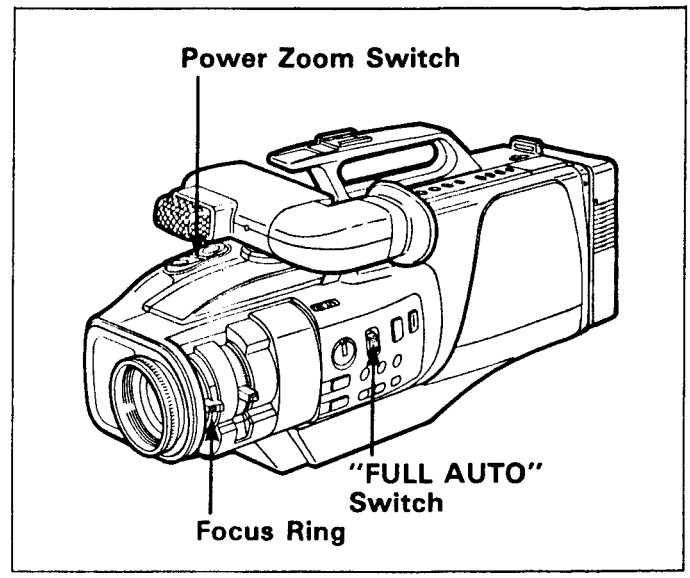
8. Objects more than 50 feet away.

■ **MANUAL FOCUS**

1. Set **"FULL AUTO"** switch to **"MAN"** position.
2. Zoom in on the object by pressing the power zoom switch on the **"T"** side.

   NOTE: See below for **"POWER ZOOM"**.
3. Focus on the object by turning the focus ring.

   NOTE: If focusing is performed without zooming up first, the picture may become out of focus when the zoom-in is done during actual picture taking.
4. Then, zoom out from the object as desired. The object will remain in focus



AUTO IRIS

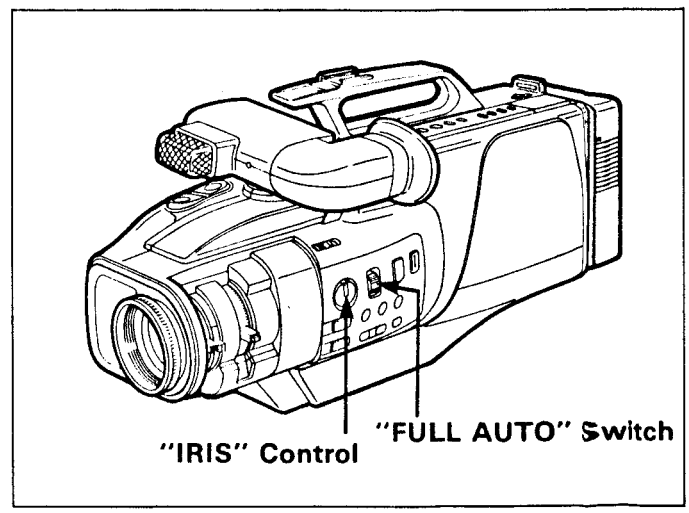
This camera/recorder is provided with an auto iris mechanism which automatically adjusts the lens aperture in accordance with the available light when **"FULL AUTO"** switch is set to **"AUTO"** or **"IRIS"** control is placed in **"AUTO"** (center) position. When the object is dark, the iris opens automatically, and it closes when the object is bright. When the power is switched off, the iris is automatically set to the fully closed position.

■ **To manually adjust the iris**

You can also adjust the iris manually.

- When the object is in bright light and the background is dark, set **"FULL AUTO"** switch to **"MAN"** and adjust **"IRIS"** control counterclockwise to narrow the iris opening.
- When the background is in bright light and the object appears to be too dark, set **"FULL AUTO"** switch to **"MAN"** and adjust **"IRIS"** control clockwise to widen the iris opening.

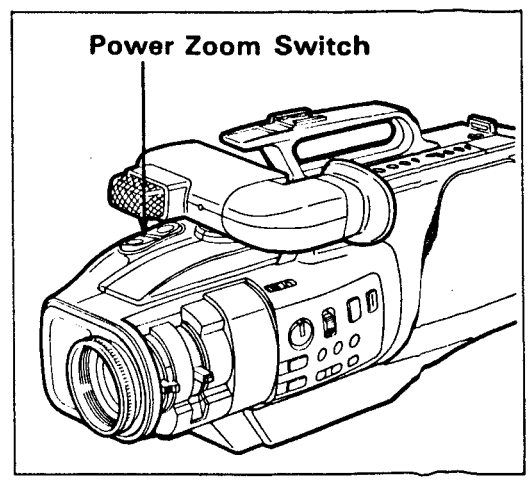
NOTE: After iris correction, set the **"FULL AUTO"** switch to **"AUTO"** or the **"IRIS"** control to the **"AUTO"** (center) position.



POWER ZOOM

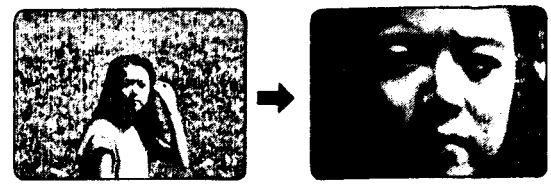
- Press power zoom switch on the **"W"** side, and the picture gradually widens.

- Press power zoom switch on the **"T"** side, and the picture gradually becomes telescopic.

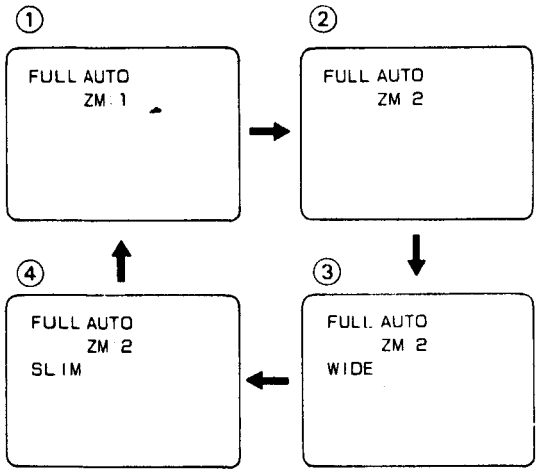


DIGITAL ZOOM

This feature allows you to increase the magnification of the image at the center of the screen up to 2 or 8 times greater than the extreme telephoto position.



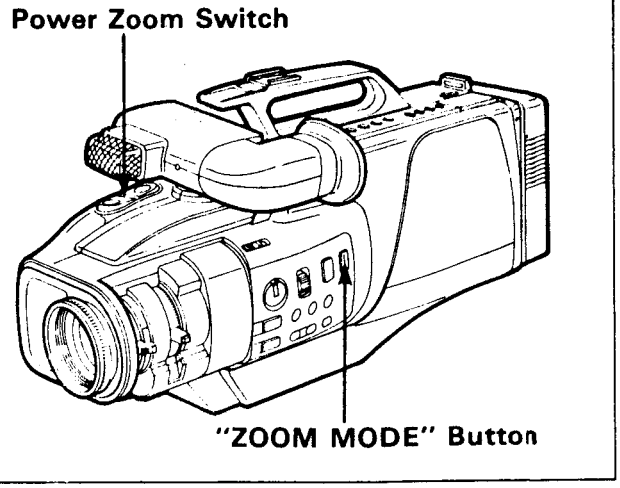
1. Press **"ZOOM MODE"** button to select **"ZM:1"** or **"ZM:2"**. The display in the viewfinder will change as follows each time the button is pressed.



2. Press and hold **"T"** side of the power zoom switch. The digital zoom functions from the extremely telephoto position of X8.
   - **"ZM:1"** enlarges the image from X8 to X16.
   - **"ZM:2"** enlarges the image from X8 to X64.
   - **"ZM:2 with WIDE"** enlarges the image from X8 to X64 and also widens it.
   - **"ZM:2 with SLIM"** enlarges the image from X8 to X64 and also makes it thinner.

   You can control the digital enlargement ratio by pressing the **"T"** or **"W"** side of the power zoom switch. When the zoom ratio falls below X8, the normal zooming function is restored.

   NOTE: If you select a zoom ratio over X8, it is displayed in the viewfinder. At X36, for example, **"X36"** is displayed.
3. After using the digital zoom feature, press the **"ZOOM MODE"** button to select either display ① or ② above. If display ③ or ④ is selected, the picture image in the viewfinder is different from the subject being shot.



BEFORE YOU START TAKING PICTURES WITH YOUR HITACHI DIGITAL ZOOM CAMERA/RECORDER

Hitachi's digital zoom lets you really get close to the action. Due to the unique nature of this feature here are some important points to consider before you start:

As with all digital zoom camera/recorders picture clarity diminishes at high zoom ratios. That is why Hitachi camera/recorders are equipped with a zoom odometer (numbers in the upper left corner of the viewfinder). You can use the odometer to determine your personal preference setting between zoom ratio and picture performance, then use that setting as your upper zoom ratio limit.

When you zoom in on your subject, at some point camera shake will become noticeable. As you reach the upper limits of the zoom ratio, the need for a tripod increases. Use the zoom odometer to judge your acceptable limit to hand-holding the camera/recorder.

Since no two people will use their camera/recorders in exactly the same way, you should test the digital zoom feature by making a brief test tape at various zoom settings. So get comfortable with your new Hitachi camera/recorder then go out and get close to the action.

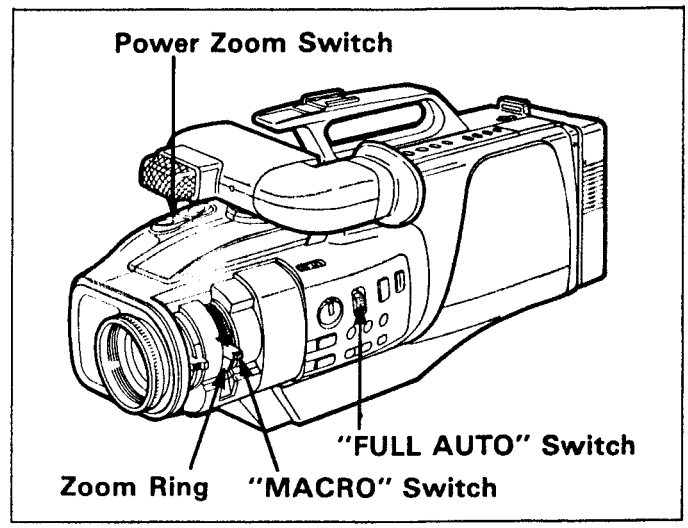
MACRO

It permits you to shoot objects as close as 1/16 inches from the lens tip.

1. Set "**FULL AUTO**" switch to "**MAN**" position.
2. Turn the zoom lever to "**MACRO**" while pressing "**MACRO**" switch.
3. Turn the zoom ring within the "**MACRO**" range (green line on the zoom ring) for focusing.

You can shoot objects at a distance with maximum magnification as follows.
This is convenient when shooting objects such as a butterfly on a flower as you cannot approach it too closely.
You can shoot objects up to 2.6 feet from them.

1. Set "**FULL AUTO**" switch to "**AUTO**" position.
2. Zoom up the object fully by pressing the "**T**" side on the power zoom switch. The object will be auto focused.



NOTES:

- Be careful as the lighting tends to be low when shooting in the above conditions.
- Fix the camera on a tripod.
- Determine the size of the object by moving the camera backward and forward.

FADE IN FADE OUT

This feature lets you add a professional touch to your home recordings. When you fade into a scene, the recording will start with a blank scene and the picture will gradually appear. The picture gradually disappears when fading out.

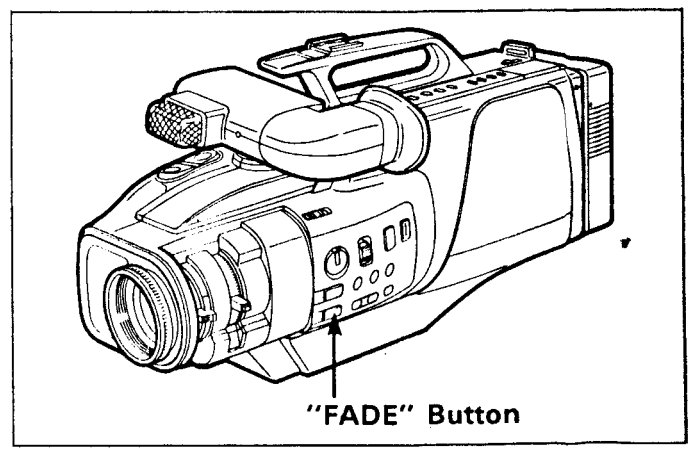
■ **FADE-IN**

1. Press and hold "**FADE**" button, and then press record start/stop button to start recording.
2. Release "**FADE**" button after a few seconds. The picture will gradually appear on a blank screen.

■ **FADE-OUT**

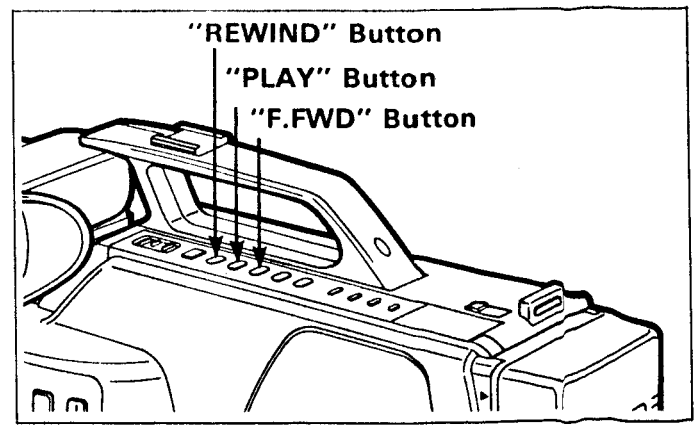
1. Press and hold "**FADE**" button during recording. The picture will gradually disappear from the screen.
2. Press record start/stop button to stop recording, and then release "**FADE**" button. The picture will reappear in the viewfinder.

NOTE: Both picture and sound will gradually appear and disappear. The fade speed is automatically controlled by the camera/recorder.



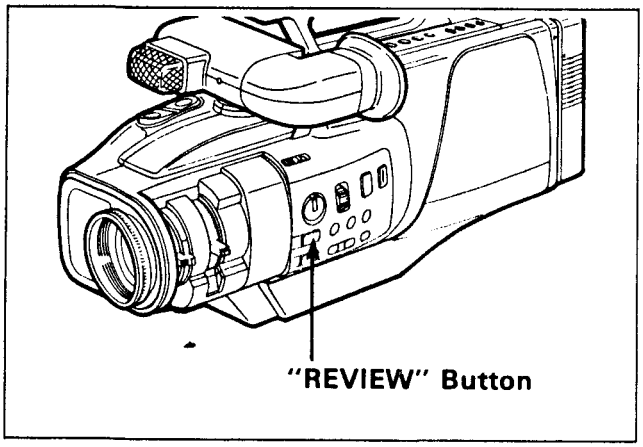
QUICK EDIT (EDIT SEARCH)

The quick edit feature allows you to search for the end of previously recorded material, or find a particular spot on your tape, to begin your editing, or recording new material. Quick edit is used while the camera/recorder is in the record/pause (stand-by) mode. By holding down the "**F.FWD**", "**REW**", or "**PLAY**" button you can visually search or play your tape. Releasing the buttons ("**F.FWD**", "**REW**", or "**PLAY**") immediately stops the tape at that position.

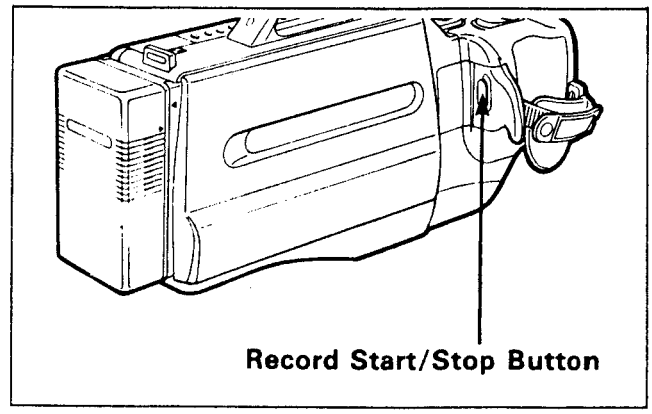


INSTANT REVIEW

1. In record/pause (stand-by) mode, press **"REVIEW"** button, and the last few seconds of the recorded scene is played back in the reverse direction and then played back in the forward direction.



2. When the tape reaches the end of the scene you have just recorded, the camera/recorder returns to the record/pause (stand-by) mode.
Recording starts again when the record start/stop button is pressed again.

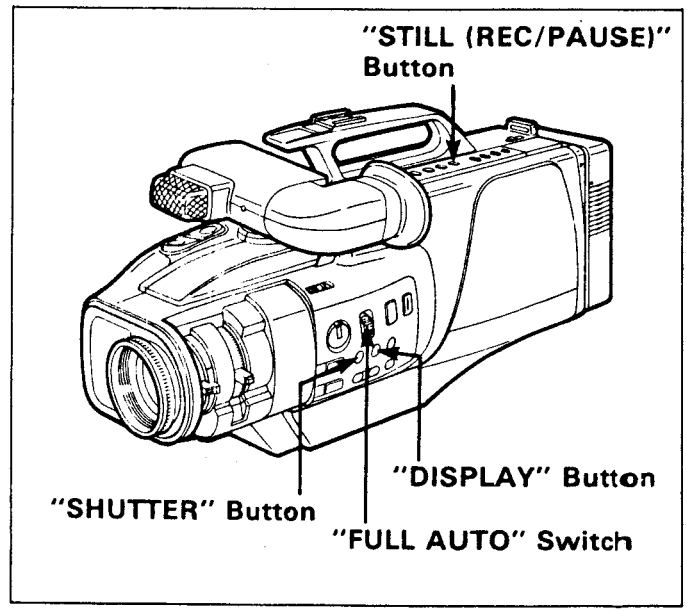


VARIABLE SHUTTER SPEED

Use this feature to shoot tennis and golf shots that contain rapid movement. You can replay the still pictures at the crucial moments without any fluctuations.
Normally the program AE feature operates and selects the optimum shutter speed, 1/60, 1/100, 1/120 or 1/250, according to the brightness of the subject when the **"FULL AUTO"** switch is set to **"AUTO"**. To increase the shutter speed, follow the procedure below.

1. In record/pause (stand-by) or record mode, press **"DISPLAY"** button to display battery level indicator in the viewfinder.
2. Set the **"FULL AUTO"** switch to **"MAN"** and then press the **"SHUTTER"** button until the desired speed appears in the viewfinder. The speed changes from AE mode to 1/60, 1/120, 1/250, 1/1000, 1/2000, 1/10,000 and back to AE mode each time the button is pressed.
For example, the speed is 1/1000 seconds, **"S:1000"** will be displayed in the viewfinder.

   NOTE: When the shutter speed is 1/60 seconds, **"S:60"** will not be displayed in the viewfinder.
3. Press record start/stop or **"STILL (REC/PAUSE)"** button to start recording.



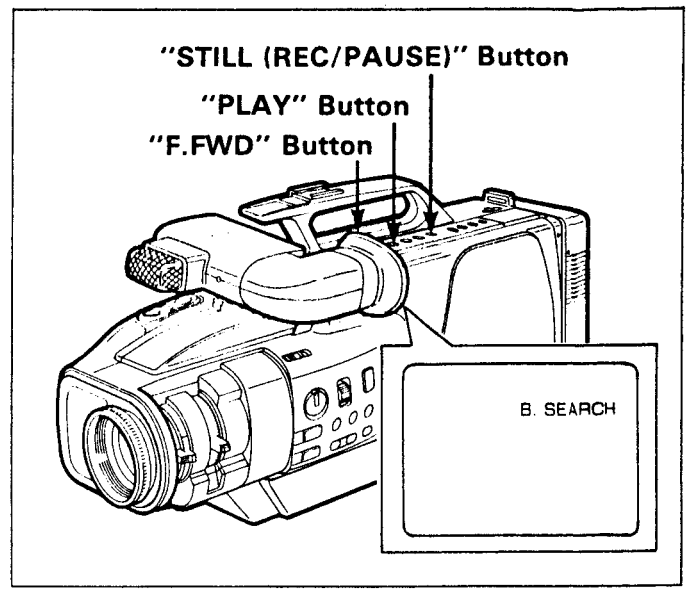
NOTES:

- After use, set the **"FULL AUTO"** switch to **"AUTO"**.
- When there is low light, the **"LOW LIGHT"** indication appears in the viewfinder to warn you. In this case, reduce the shutter speed or use an additional light.
- When a tape that was recorded using the high speed shutter feature is played back, scenes changes will not be seen as a smooth motion.
- When the camera is pointed at an object that is moving rapidly, it may not focus properly in the auto focus mode. In this case, focus manually.
- When recording under the illumination of fluorescent lamp, a mercury vapor lamp or a sodium lamp, flickering may occur.

BLANK SEARCH

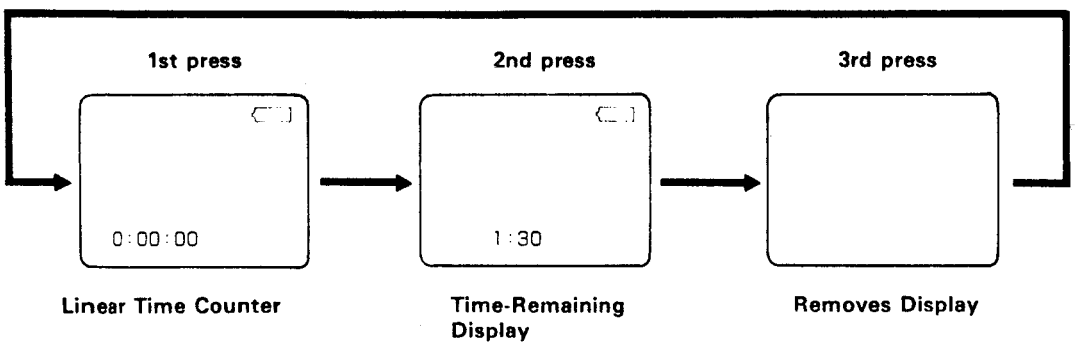
When you want to record on a blank part of a recorded tape, use the blank search feature to find a non-recorded section on the tape easily.

1. In the record/pause (stand-by) mode, press and hold **"PLAY"** and **"F.FWD"** buttons at the same time until **"B.SEARCH"** appears in the viewfinder. The blank search function fast forwards the tape to search for a non-recorded section lasting for more than 3 minutes. The tape is then rewound to the beginning of the non-recorded section, and the camera/recorder enters the record pause (stand-by) mode.
2. Press the record start/stop or **"STILL (REC/PAUSE)"** button to start recording.



DISPLAY BUTTON

Pressing the **"DISPLAY"** button lets you check several special displays in the viewfinder.

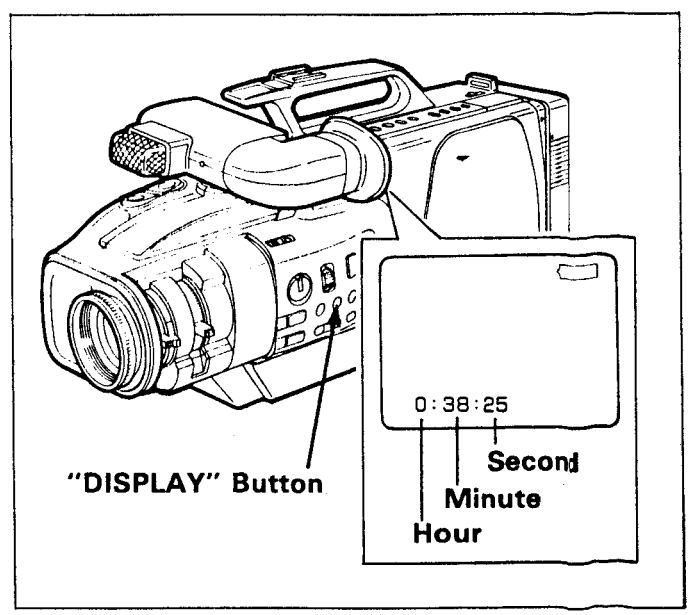


LINEAR TIME COUNTER

Shows length of tape run in hours, minutes and seconds. Press **"DISPLAY"** button to select the linear time counter display.
Load a cassette into the camera/recorder and perform recording or playback; the counter indicates the elapsed time.

NOTES:

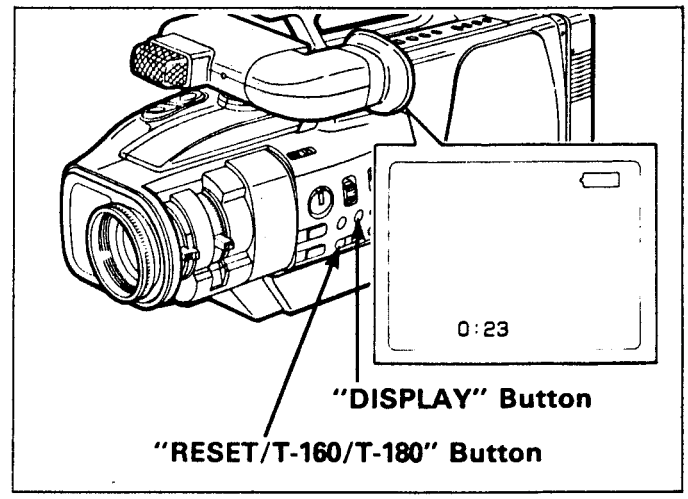
- The linear time counter does not operate when nothing is recorded on the tape.
- Counter changes to 0:00:00 when cassette is ejected.



TIME REMAINING

When the linear time counter is present in the viewfinder, pressing **"DISPLAY"** button again will change the display to a read-out showing the amount of recording or playback time left on the tape. Pressing **"DISPLAY"** button once more clears all graphics from the viewfinder.

NOTE: When using an extended length T-160 or T-180 cassette, you must press **"RESET/T-160/T-180"** button to adapt the camera/recorder's time remaining system for an accurate read-out. (If the counter is being displayed, **"RESET/T-160/T-180"** button resets the counter to **"0:00:00"**.)

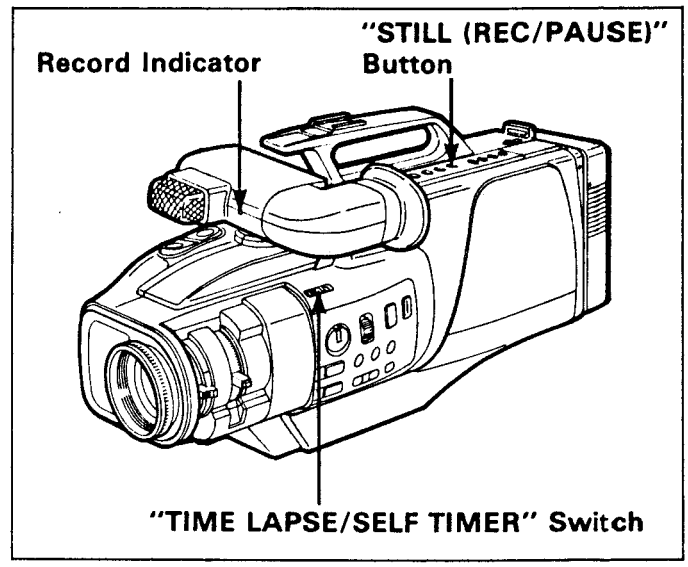


SELF TIMER

The self timer allows you to automatically start recording after about ten seconds.

Slide **"TIME LAPSE/SELF TIMER"** switch **once** while in the record/pause mode.
The **"SELF 30REC 0:10"** appears in the viewfinder. The camera/recorder will automatically start recording after ten seconds when the record start/stop or **"STILL (REC/PAUSE)"** button is pressed and will continue to record for approx. 30 seconds.

If you slide the **"TIME LAPSE/SELF TIMER"** switch **twice**, the **"SELF RECORD 0:10"** appears in the viewfinder. The camera/recorder will automatically start recording after ten seconds when the record start/stop or **"STILL (REC/PAUSE)"** button is pressed and then recording will continue until the record start/stop or **"STILL (REC/PAUSE)"** button is pressed.



NOTES:

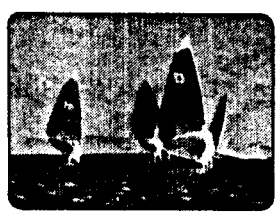
- Record indicator flashes for about 10 seconds to indicate self timer mode when you press the record start/stop or **"STILL (REC/PAUSE)"** button and stays on during recording.
- Pressing the record start/stop or **"STILL (REC/PAUSE)"** button before recording starts releases the self timer mode.
- To stop the camera/recorder during self timer recording, press record start/stop or **"STILL (REC/PAUSE)"** button and the camera/recorder will enter the record/pause (stand-by) mode.
- The **"TIME LAPSE/SELF TIMER"** switch has no effect during normal recording.

NEGATIVE/POSITIVE INVERSION

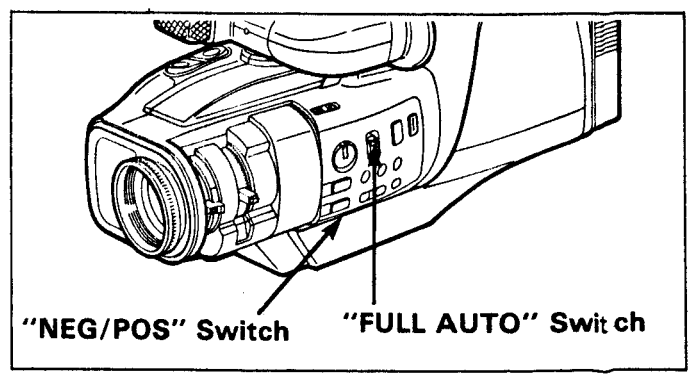
You can record a subject while inverting the colors and black/white as in a negative film.

- Set **"FULL AUTO"** switch to **"AUTO"** to obtain a positive picture automatically.
- To obtain a negative picture, set **"FULL AUTO"** switch to **"MAN"** and then slide **"NEG/POS"** switch to the right.

Positive picture



Negative picture

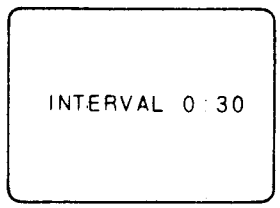


NOTE: Always return **"FULL AUTO"** switch to **"AUTO"** after shooting.

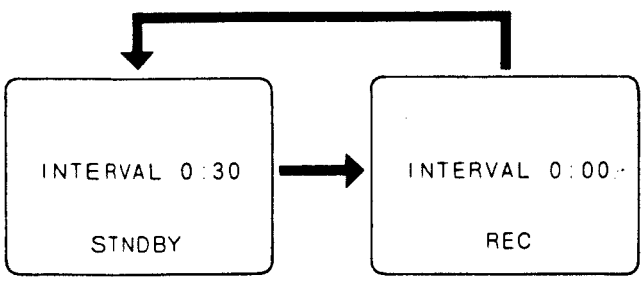
TIME LAPSE RECORDING

This function is convenient to record the blooming of flowers, etc. as it starts and stops recording at a predetermined interval.
For example, this function allows recording for one second after a pause of 30 seconds and repeats this procedure.

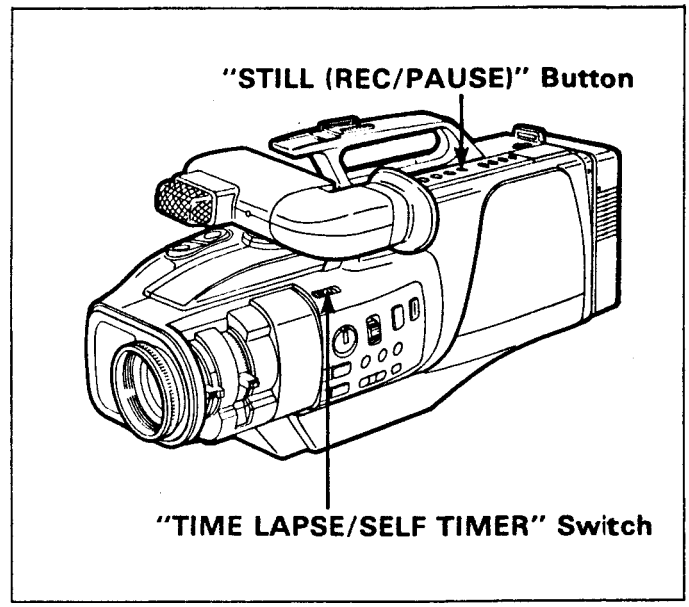
1. In the record/pause (stand-by) mode, slide **"TIME LAPSE/SELF TIMER"** switch repeatedly until the length of time you want between recordings appears in the viewfinder.
   - The display is changed from "SELF 30REC 0:10" to "SELF RECORD 0:10", "INTERVAL 0:30 (30 seconds)" "INTERVAL 1:00 (1 minute)", "INTERVAL 2:00 (2 minutes)", "INTERVAL 5:00 (5 minutes)", "INTERVAL MAN (Manual)" and again to "SELF 30REC 0:10" every time the switch is slid.



2. Press the record start/stop or **"STILL (REC/PAUSE)"** button.



   - The clock starts counting, and when it reaches **"0:00"**, a recording is performed for one second, and then the record/pause (stand-by) mode is entered. After 30 seconds, recording is repeated for another second.



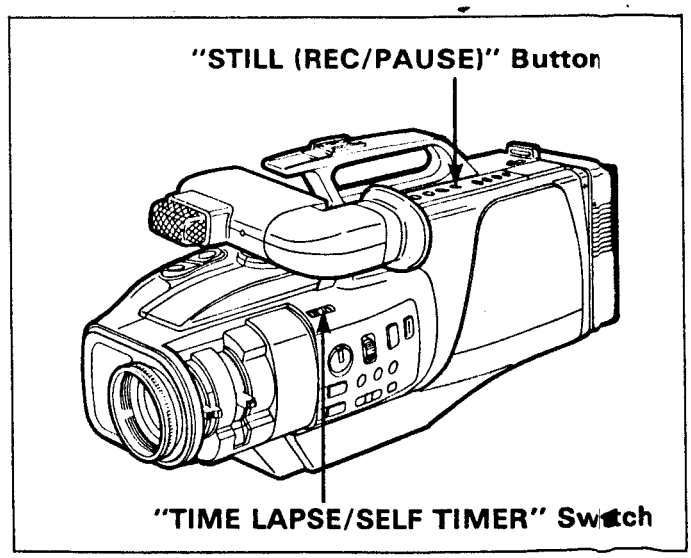
3. Press the record start/stop or **"STILL (REC/PAUSE)"** button to stop recording.

NOTES:
- Do not continue to interval record for more than 48 hours.
- The interval time can be changed any time (even during time-lapse recording) by sliding **"TIME LAPSE/SELF TIMER"** switch.
- If **"MAN"** is selected for the interval time, one shot recording can be done.

ONE SHOT RECORDING

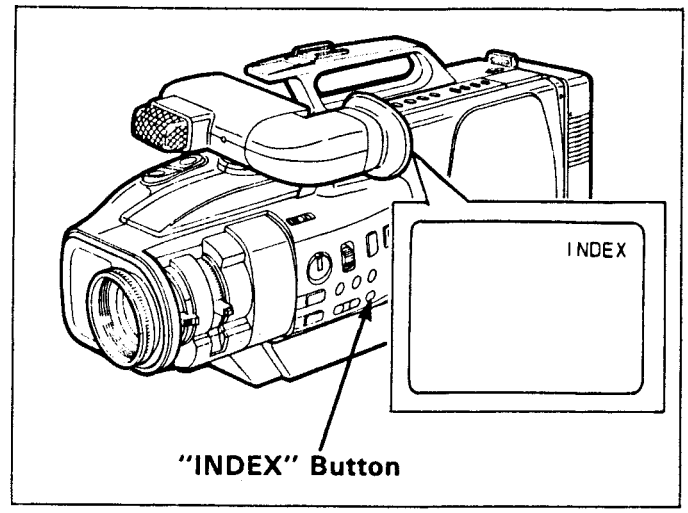
This function is used to produce an animated video. With one shot recording a few frames are recorded every time the record start/stop button is pressed. Shoot a doll, etc. while moving it slightly between shots to produce an animated video of your own.

1. In the record/pause (stand-by) mode, slide **"TIME LAPSE/SELF TIMER"** switch repeatedly to select **"INTERVAL MAN"**.
2. Press the record start/stop or **"STILL (REC/PAUSE)"** button.
   - One shot (a few frames) is recorded every time the button is pressed.
3. Slide **"TIME LAPSE/SELF TIMER"** switch so that **"INTERVAL MAN"** disappears to stop recording.



INDEX SIGNAL RECORDING/PLAYBACK

Indexing your tapes while recording makes it easy to find desired program segments when you play back the tape in your camera/recorder or a VCR that has a compatible indexing feature called the "VHS Index Search System".



Index Recording

"INDEX" signals are recorded when the following operations are performed.

- When the **"INDEX"** button is pressed during recording.
- When the **"INDEX"** button is pressed in the record/pause (stand-by) mode and **"INDEX"** is displayed in the viewfinder, then recording is started.
- When power is turned on about 4 hours after it is switched off and then recording is started.
- When power is turned on after the date is changed to the next day with the power off and then recording is started.

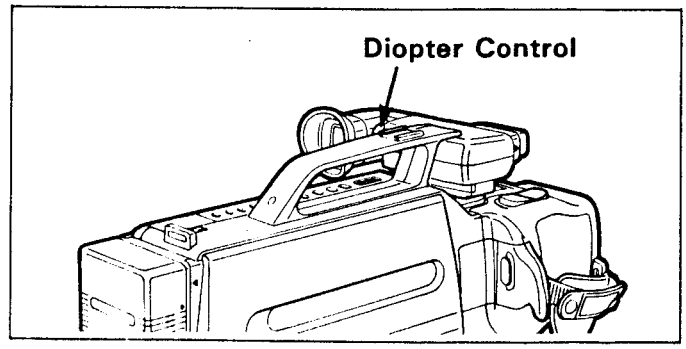
NOTE: When **"INDEX"** button is pressed, **"INDEX"** is displayed in the viewfinder, and when an **"INDEX"** signal is recorded, **"INDEX"** disappears.

Index Playback

1. Place **"POWER"** switch in **"VCR"** position.
2. Press **"INDEX"** button to display **"INDEX"** indicator in the viewfinder.
3. Press **"F.FWD"** or **"REW"** button. The camera/recorder will automatically search for the next index mark. When the camera/recorder locates an index mark, it will stop and begin playback.

EYEPIECE ADJUSTMENT

To use the electronic viewfinder without eyeglasses on, adjust the diopter control for optimum focus adjustment.



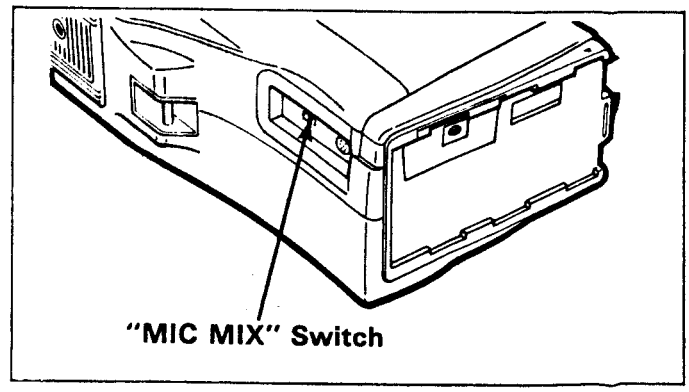
MICROPHONE MIXING

You can mix audio through a microphone during playback.
Connect a source from which you want to mix sound, following the procedure shown on page 36.

NOTE: If no external microphone or equipment is connected, you can mix sound from the built-in microphone.

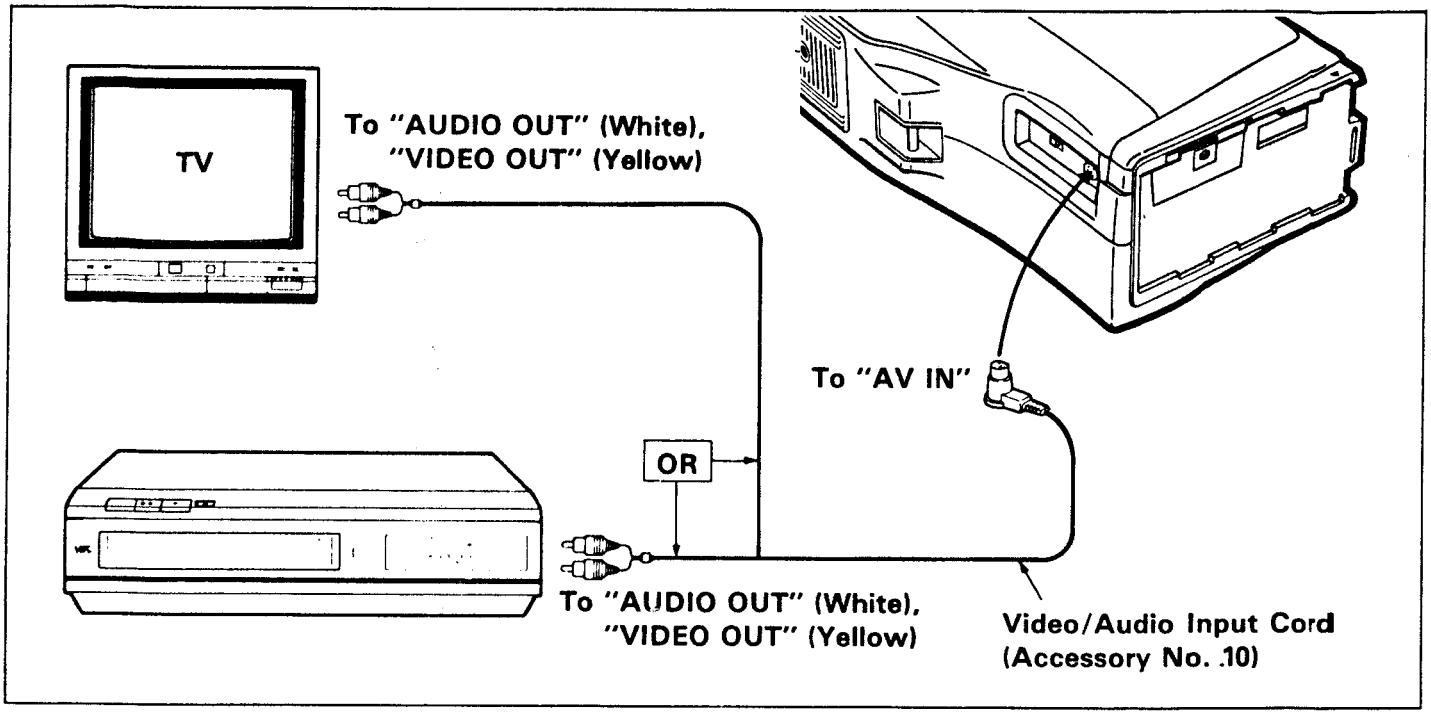
1. Set **"MIC MIX"** switch on the bottom of the camera/recorder to **"ON"**.
2. Place **"POWER"** switch in **"VCR"** position.
3. Press **"PLAY"** button to play a tape.
   - The picture appears on the TV and sound is output. When you speak to the built-in microphone, your voice is also output from the TV. When external equipment is connected, the sound from it is also output from the TV.

   NOTE: If you use this microphone mixing function when copying a tape from the camera/recorder to a VCR, you can copy the mixed sound.

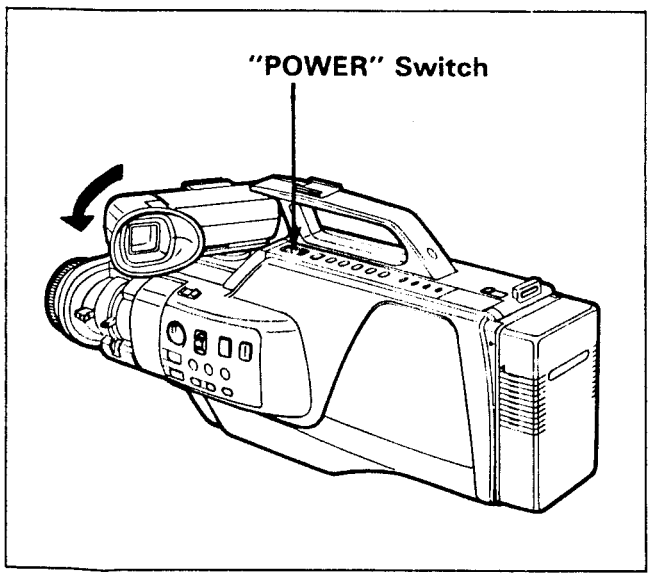


RECORDING TV PROGRAMS

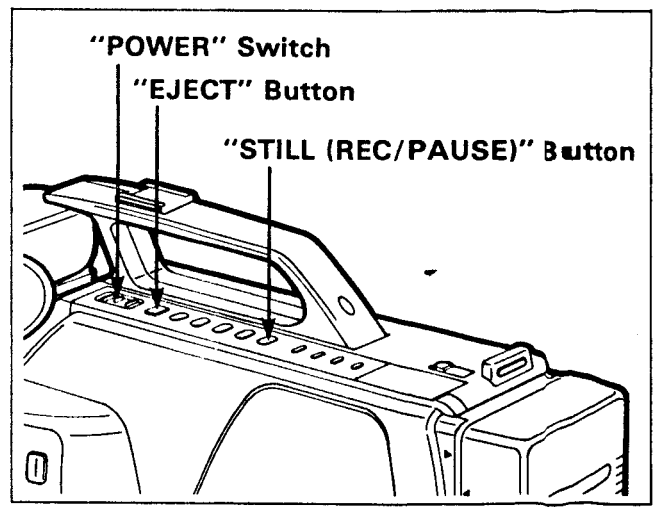
If your TV or VCR has video/audio out jacks, you can record the TV program with camera/recorder.



1. Connect the video/audio input cord to **"AUDIO OUT"** and **"VIDEO OUT"** of your TV or VCR.
2. Connect the other end to **"AV IN"** of camera/recorder.
3. Insert the cassette.
   NOTE: Power source must be connected to the camera/recorder.
4. Press and hold the small button on **"POWER"** switch, and then slide it to **"CAM"** position.
5. Rotate the electronic viewfinder into the operating position. The **"POWER"** indicator will light.



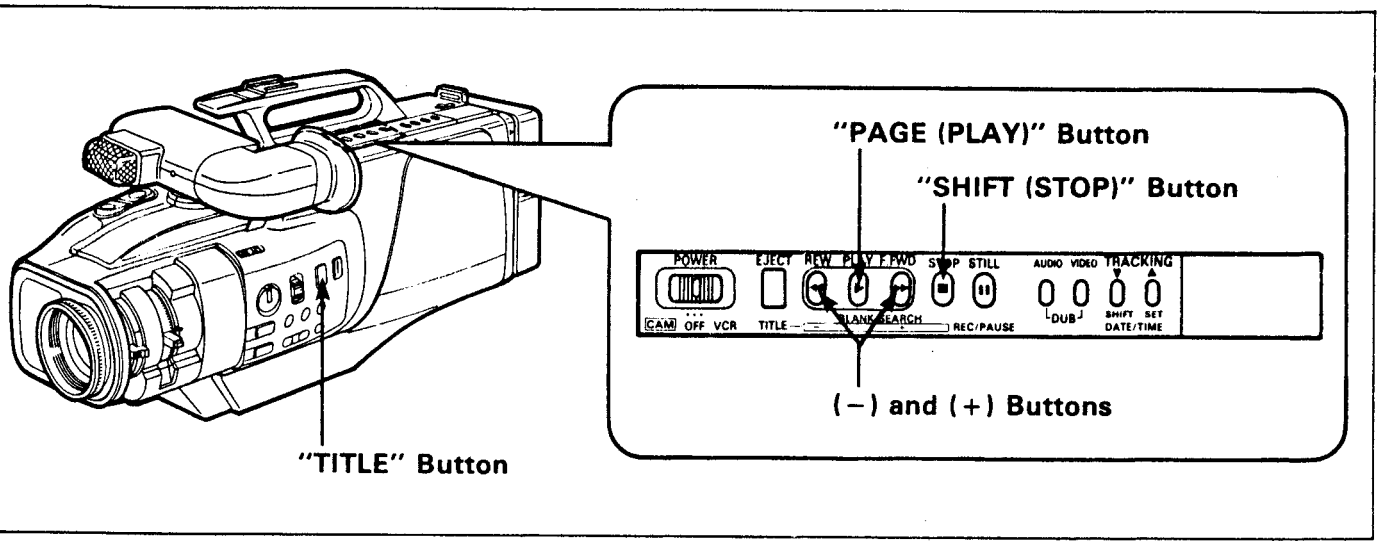
6. Turn on your TV or VCR and tune it to the channel you wish to record.
7. Press record start/stop or **"STILL (REC/PAUSE)"** button to start recording. You are now recording the TV program.
8. Press record start/stop or **"STILL (REC/PAUSE)"** button to stop recording.
9. After recording, place **"POWER"** switch in **"OFF"** and then press **"EJECT"** button to remove the cassette.



NOTE: Disconnect the external microphone when recording from **"AV IN"** jack.

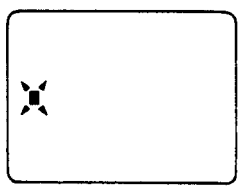
TITLE RECORDING

You can easily create and record personalized titles on your videos with the camera/recorder's built-in titler. The titler will store 2 different title pages in memory. Once a title is stored, it can be displayed and recored at anytime. Each title page can contain one line of 16 characters each.
The titler contains 47 different characters for creating titles.

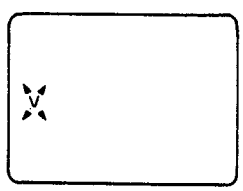


■ Creating a Title

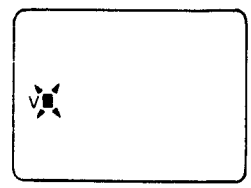
1. Attach a power source to the camera/recorder and slide **"POWER"** switch to either **"CAM"** or **"VCR"** position.
2. Press **"TITLE"** button. The flashing cursor will appear in the viewfinder.



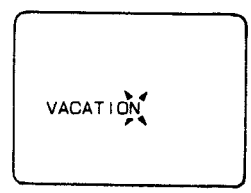
3. Press **"SHIFT"** button repeatedly to move the flashing cursor to the place you want to begin your title.
4. Select the first character for your title by pressing the (−) or (+) button repeatedly until the desired character appears.
   NOTE: Each title can contain up to one line of 16 characters each. A chart showing the characters contained in the titler is located on page 35.



5. After you have selected the first character, press **"SHIFT"** button to move the flashing cursor to the place you want the next character.



6. Repeat steps 4 and 5 until you have completed the title.

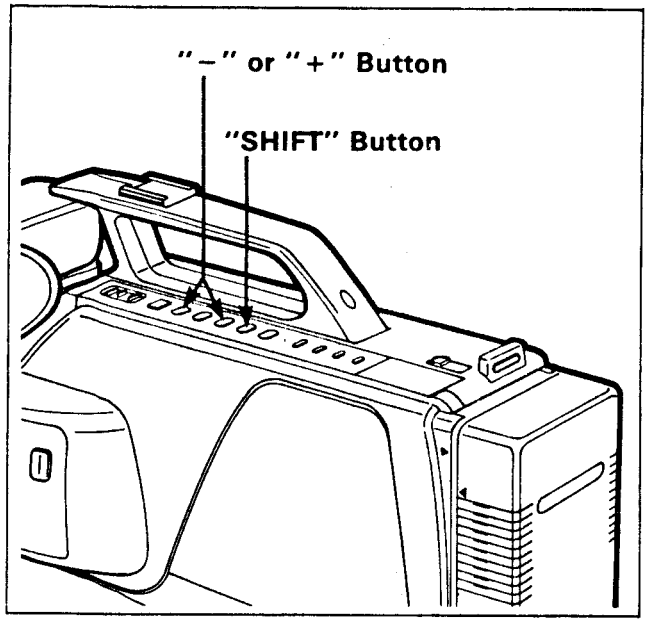


   NOTE: Character may flash, however it will be recorded correctly without flashing.

7. After completing your title, press **"PAGE"** button and create the title on another title page.
8. After creating the title, press **"TITLE"** button to remove the title graphics from the viewfinder. Now title graphics is stored in memory.

■ Correcting Errors During Title Storage

1. Press "**SHIFT**" button repeatedly until the character to be corrected will flash.
2. Press either "**–**" or "**+**" button until the correct character appears.
   NOTE: The corrected character may flash, however it will be recorded correctly without flashing.



■ Recording Titles on a Tape in the Camera/Recorder

1. Slide "**POWER**" switch to "**VCR**".
2. Locate the position on the tape that you wish to record the title.
3. Set "**POWER**" switch to "**CAM**".
   Be sure that the electronic viewfinder is in operating position.
4. Press "**TITLE**" button to display the title graphics.
5. Press "**PAGE**" button until the title you wish to record appears in the viewfinder.
6. Press record start/stop button or "**STILL (REC/PAUSE)**" button to start the title recording.
7. Press "**TITLE**" button to remove the title graphics from the viewfinder.
   The camera/recorder will now record as normal.

NOTE: If you are planning to video tape an event you must prepare your titles in advance, then by pressing "**TITLE**" button superimpose the title over the scene as it's being recorded. You cannot go back and record titles over existing video without erasing the previously recorded material.

■ Recording Titles on Another VCR while playing a Tape Back with the Camera/Recorder.

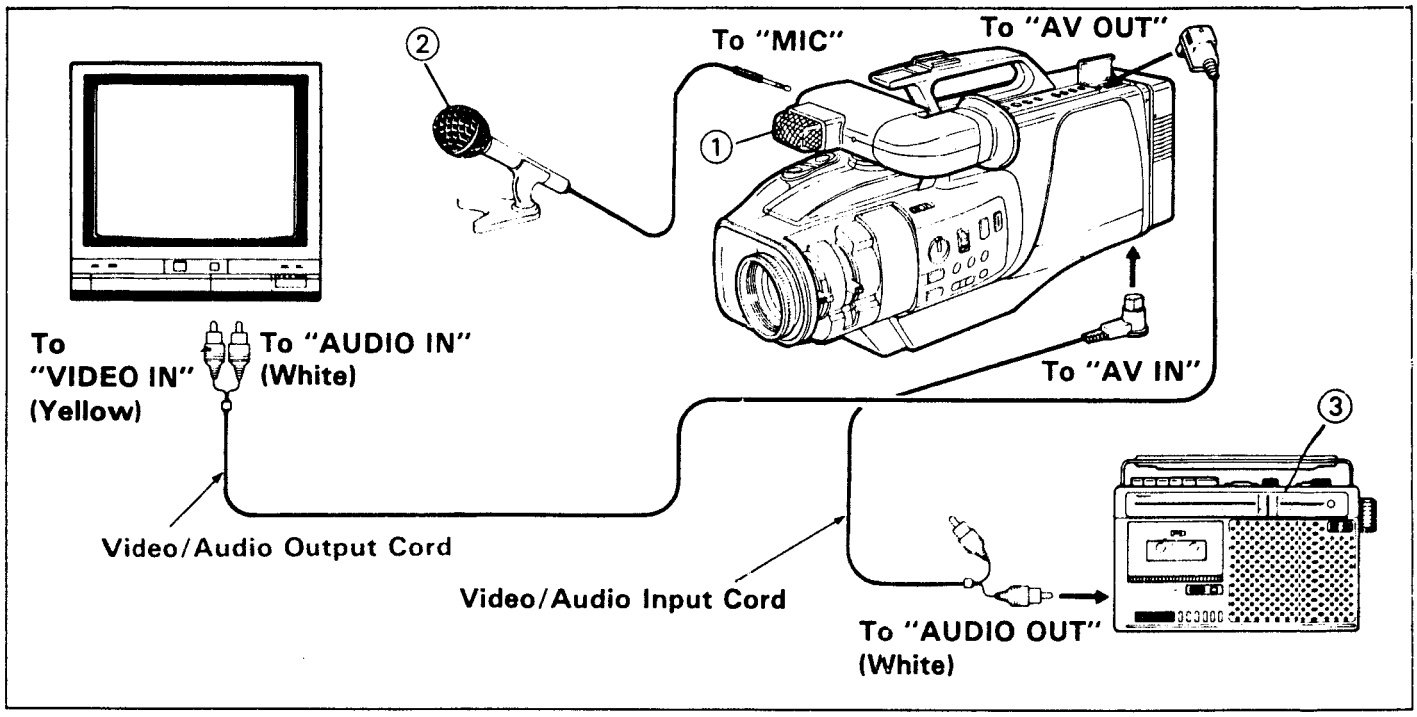
1. Connect the camera/recorder and VCR.
   (See page 41.)
2. Select the title you wish to record from page 1 or page 2. The last title selected will appear first. Press "**TITLE**" button to turn title off.
3. Set the VCR in the recording mode and camera/recorder in the playback mode.
4. Press "**TITLE**" button when you see the scene where you want to record the title.
5. Press "**TITLE**" button to erase the display from the viewfinder.

■ Chart of Characters available in the titler

A B C D E F G H I J K L M N O P Q R
S T U V W X Y Z 0 1 2 3 4 5 6 7 8 9
? ' . / , - ; : < > !

AUDIO DUBBING

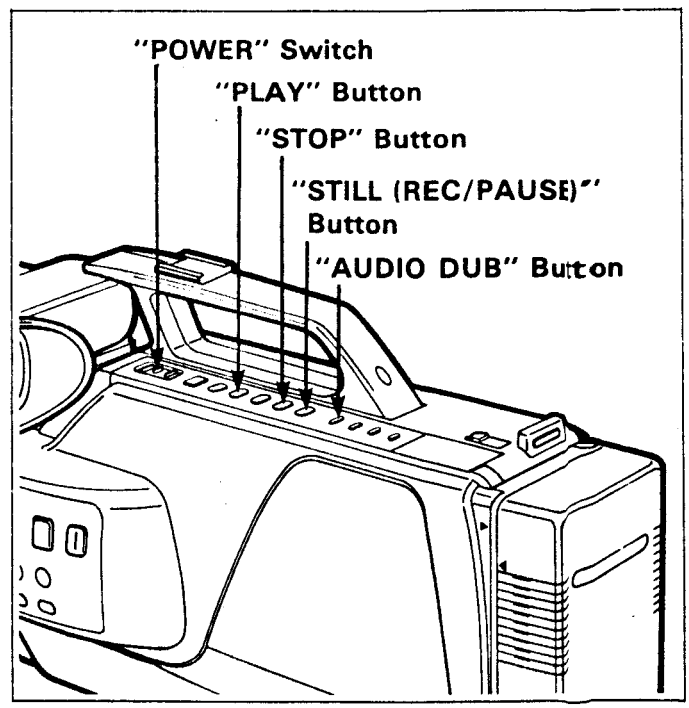
The audio dubbing feature lets you record new audio (sound) on a previously recorded tape without erasing the original video (picture).
When you audio dub a tape, the previous audio is erased and replaced with new sound.



NOTES: • Sound from the built-in microphone, external microphone and the AV IN jack can be dubbed.
• Do not connect the **"AV IN"** jack when dubbing audio from the external microphone or built-in microphone. Connecting an external microphone also switches off the built-in microphone automatically.

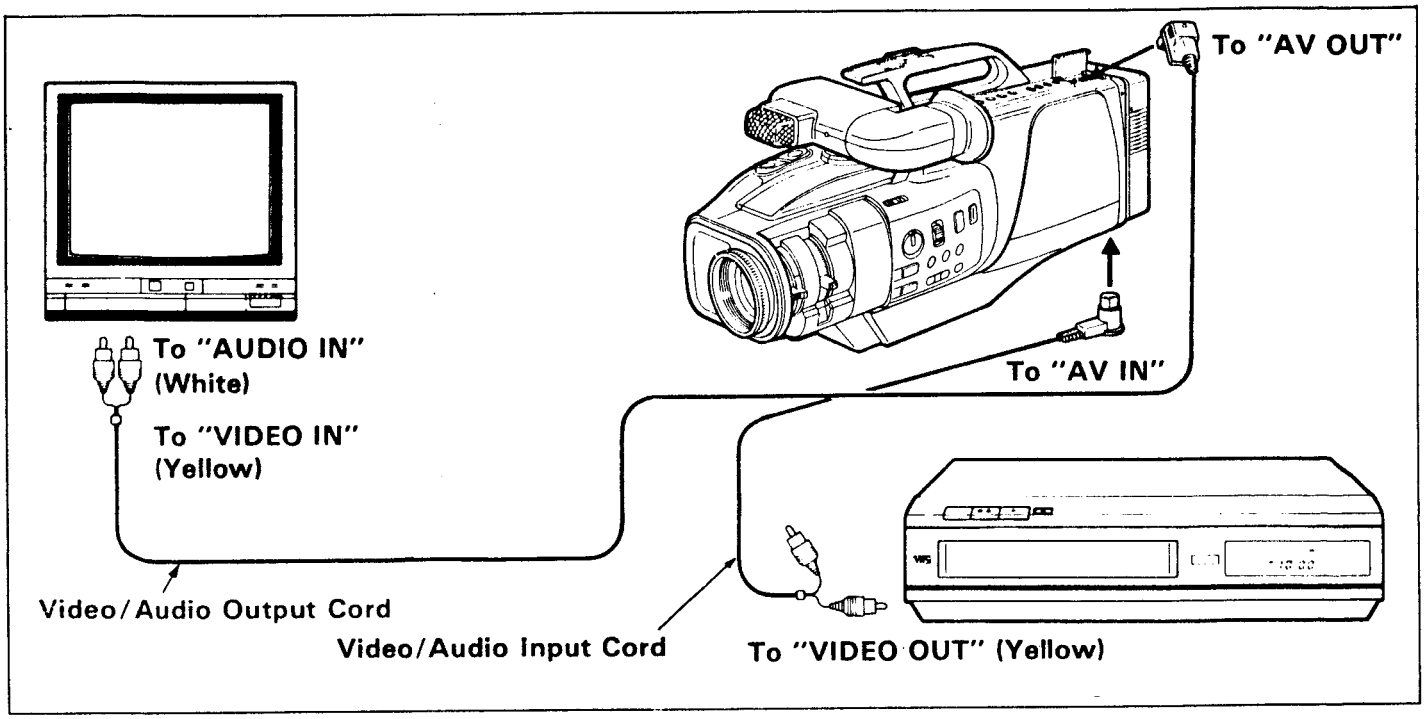
1. Insert a recorded tape.
   Be sure that the record safety tab is not missing.
2. Place **"POWER"** switch in **"VCR"** position. The electronic viewfinder may be in operating position or not for audio dubbing.
3. Play the tape and press **"STILL (REC/PAUSE)"** button where you want to dub audio.
   • The camera/recorder enters the still play mode.
4. Press **"AUDIO DUB"** and **"PLAY"** buttons at the same time.
   • **"A.DUB"** appears in the viewfinder.
5. Press **"STILL (REC/PAUSE)"** button to start audio dubbing.
6. Press **"STOP"** button to stop audio dubbing.

NOTES:
- If counter memory **"M"** appears in the viewfinder, the tape stops automatically at the reading of **"0:00:00"** and audio dubbing stops.
- You can also dub both the video and audio simultaneously if desired. To do so, press **"AUDIO DUB"** and **"PLAY"** buttons first, then press **"VIDEO DUB"** and **"PLAY"** buttons in step 4 above.



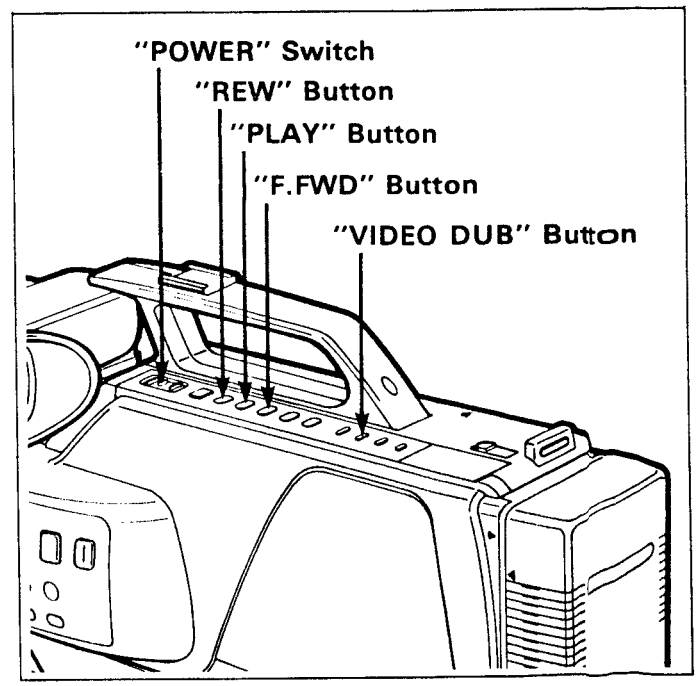
VIDEO DUBBING

The video dubbing feature lets you record new pictures on a previously recorded tape without erasing the original audio (sound).
When you video dub a tape, the previous video is erased and replaced with the new pictures. In video dubbing, the source of the video dub is whatever you are seeing in the viewfinder.



NOTE: The picture shot by the camera/recorder or the picture of a video source connected to the **"AV IN"** jack can be dubbed.

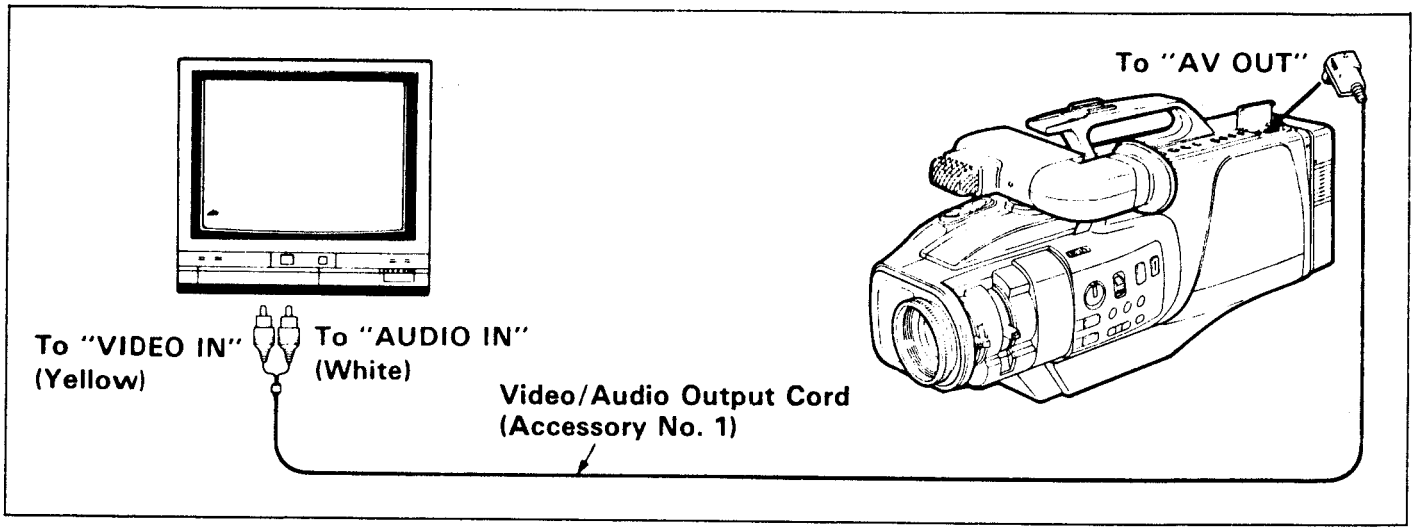
1. Insert a recorded tape.
   Be sure that the record safety tab is not missing.
2. Place **"POWER"** switch in **"VCR"** position. The electronic viewfinder may be in operating position or not for video dubbing.
3. Press **"PLAY"** button and then **"REW"** or **"F.FWD"** button to search to the approximate area on the tape where you want to begin your dub.
4. Press **"PLAY"** button again to search for the exact position that you want to stop dubbing, then press **"STILL (REC/PAUSE)"** button.
5. Press **"DISPLAY"** button so that the linear time counter appears and then press **"RESET/T-160"** button to set the counter reading to **"0:00:00"**.
6. Press **"MEMORY"** button so that the counter memory **"M"** appears.
7. Press **"REW"** button to rewind the tape to the approximate area that you want to start dubbing.
8. Press **"PLAY"** button, and when the exact position that you want to start to dub is reached, press **"STILL (REC/PAUSE)"** button.
9. Press **"VIDEO DUB"** and **"PLAY"** buttons simultaneously. **"V.DUB"** appears in the viewfinder, and at the same time the picture to be dubbed appears.
10. Press **"STILL (REC/PAUSE)"** button.
    Video dubbing will start and will stop when the counter reads **"0:00:00"**.



VIEWING THE PICTURE PLAYED BACK ON YOUR TV

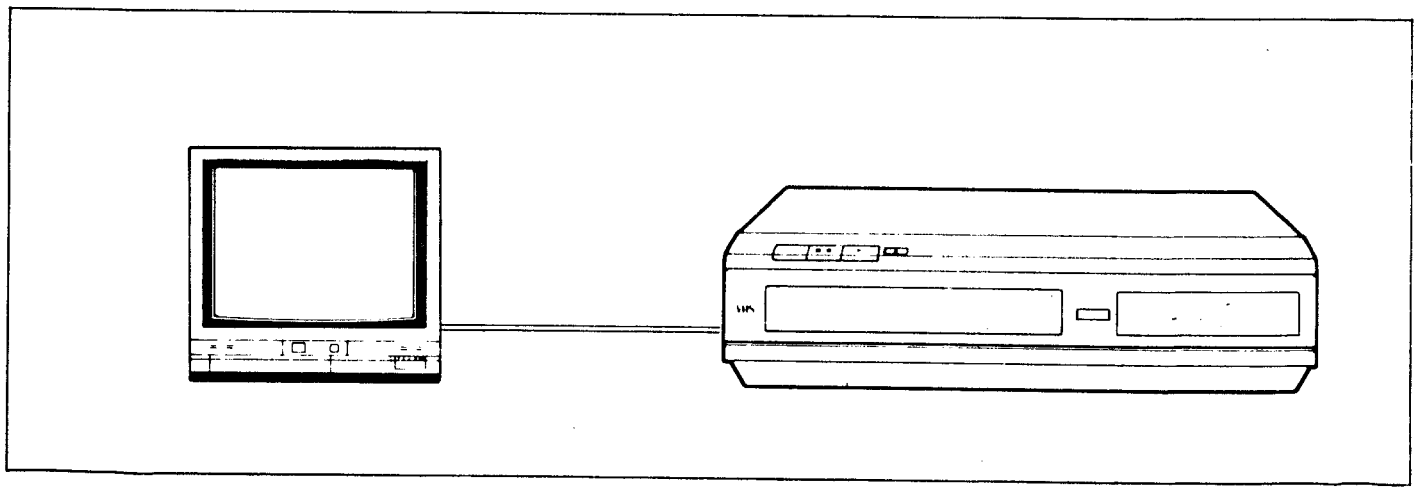
To play back a tape recorded on your camera/recorder and view it on your TV receiver, you must connect the camera/recorder to the TV receiver using either video/audio output cord (Accessory No. 1) or RF converter unit. You also may play back the tape recorded by your camera/recorder on any other VHS video cassette recorder. The camera/recorder records and plays back in VHS standard speed (SP). A tape recorded in long play (LP) or extra long play (EP) cannot be played back on this camera/recorder.

Example 1: If your TV has "VIDEO IN" and "AUDIO IN" jacks,



1. Connect the video/audio output cord (Accessory No. 1) to **"AUDIO IN"** and **"VIDEO IN"** of your TV.
2. Connect the other end of the video/audio output cord to **"AV OUT"** of your camera/recorder.
3. Turn on TV.
4. Press **"EJECT"** button on the camera/recorder and then insert the cassette.
5. Place **"POWER"** switch in **"VCR"** position.
6. Press **"PLAY"** button.
7. After playing press **"STOP"** button.

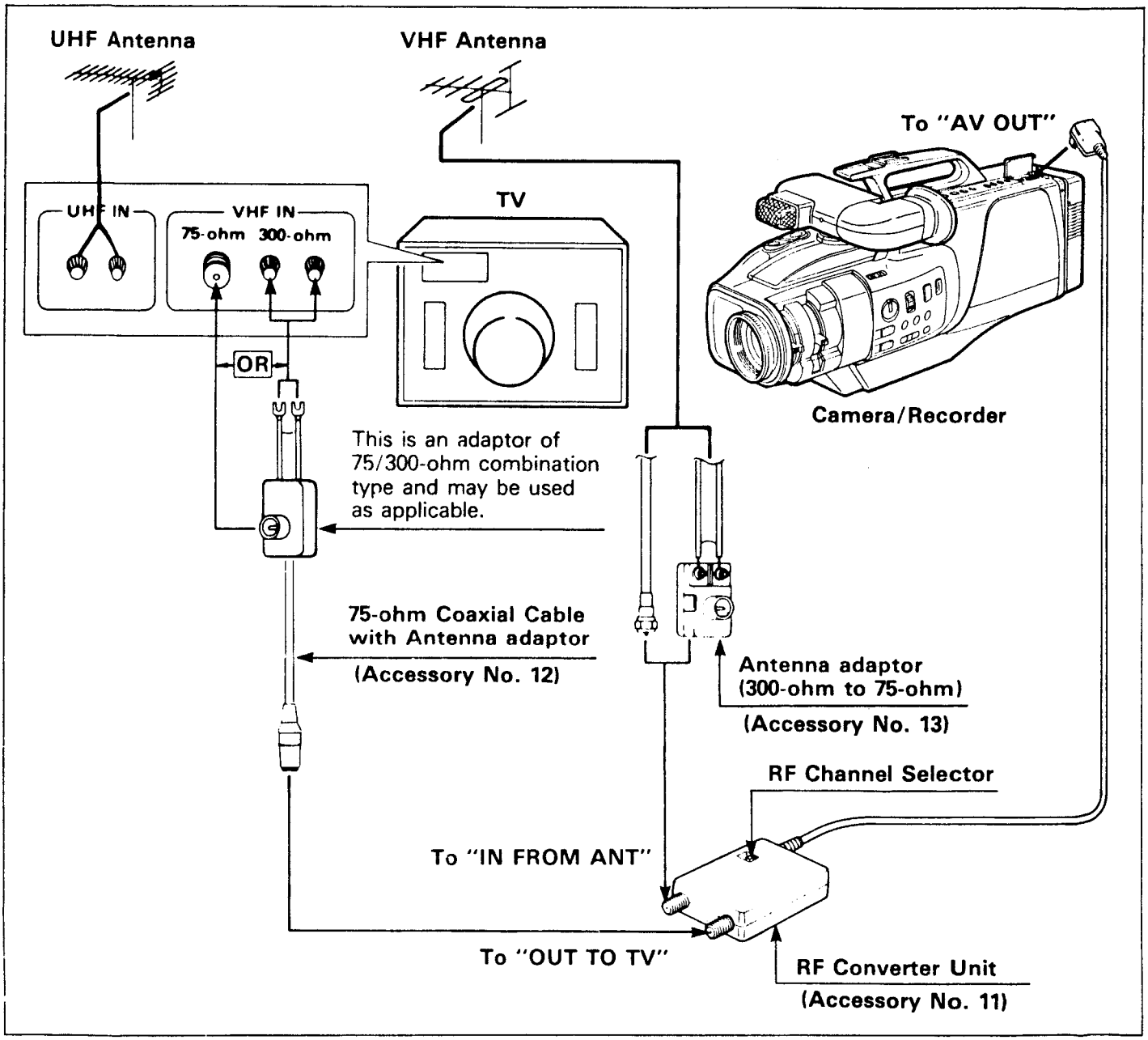
Example 2: If you have a VHS VCR,



1. Insert the recorded tape into your VCR.
2. Press **"PLAY"** button of your VCR.

NOTE: When noise appears in the played back picture, adjust **"TRACKING"** control on the VCR so there is no noise.

Example 3: If your TV is a regular TV,



1. Disconnect the VHF antenna leads from the rear of the TV receiver.

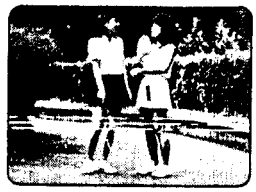
   NOTE: Leave the UHF antenna leads connected to the TV.
2. Connect the VHF antenna lead to **"IN FROM ANT"** on the RF converter unit. If the cable is round (75-ohm), it will connect directly to the **"IN FROM ANT"**. If it is the flat type (300-ohm), connect it to the antenna adaptor (300-ohm to 75-ohm) and slip the adaptor on to the **"IN FROM ANT"** terminal.
3. Connect the 75-ohm coaxial cable with antenna adaptor to **"OUT TO TV"** on the RF converter unit.
4. Connect the other end to the VHF antenna terminal on the TV, as illustrated.
5. Connect the connector cable from RF converter unit to **"AV OUT"** jack on the camera/recorder.
6. Turn on the TV and set to channel 3 unless channel 3 is one of the TV stations in your area. If channel 3 is used in your area, set your TV to channel 4.
7. Set the RF channel selector on the RF converter unit to **"CH3"** or **"CH4"** to match the channel selector on your TV.
8. Perform same procedures in steps 4 through 7 of **"Example 1"** on page 38.

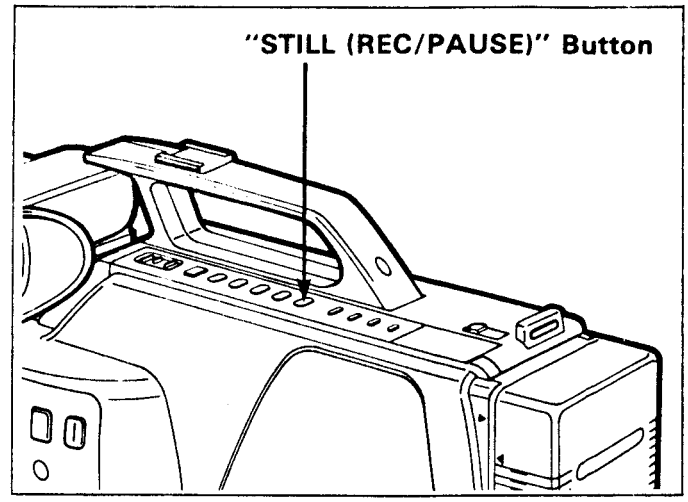
NOTE: If you want to watch a TV program with camera/recorder connected as illustrated, slide **"POWER"** switch of the camera/recorder to **"OFF"**.

STILL

When **"STILL (REC/PAUSE)"** button is pressed during playback, a still picture can be seen. To start again press **"STILL (REC/PAUSE)"** button and playback will be resumed.

NOTE: There will be some noise (interference) in the still picture.

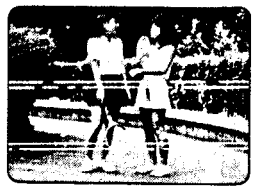


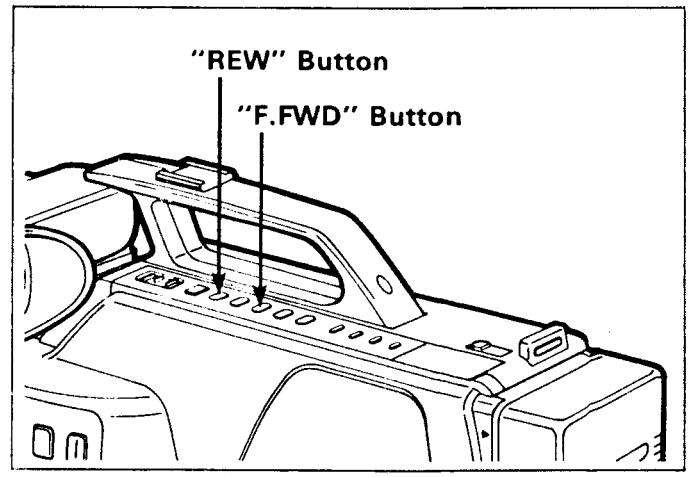


FORWARD AND REVERSE SEARCH

When you press **"F.FWD"** or **"REW"** button during playback, the tape will be played back at a speed about 3 times faster than the normal playback speed, and you can easily locate a certain spot on the tape. Press **"PLAY"** button to return to normal playback mode or press **"STOP"** button to stop tape movement.

NOTE: There will be some noise (interference) in the foward or reverse search pictures while visually scanning.



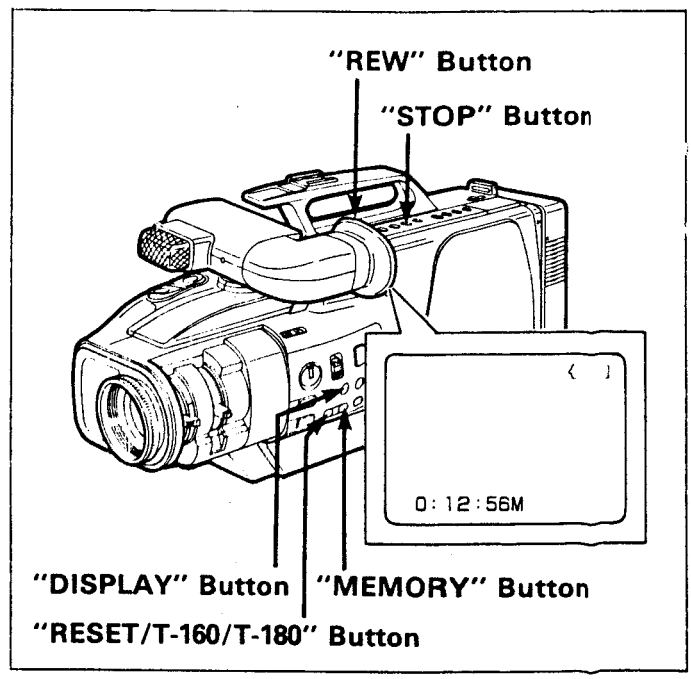


MEMORY

When the linear time counter with memory indication appears in the viewfinder, a tape that is being rewound automatically stops when the counter reads approximately **"0:00:00"**. This is useful if there is a section of tape you want to review immediately after recording or if you want to return to the same point several times in a row.

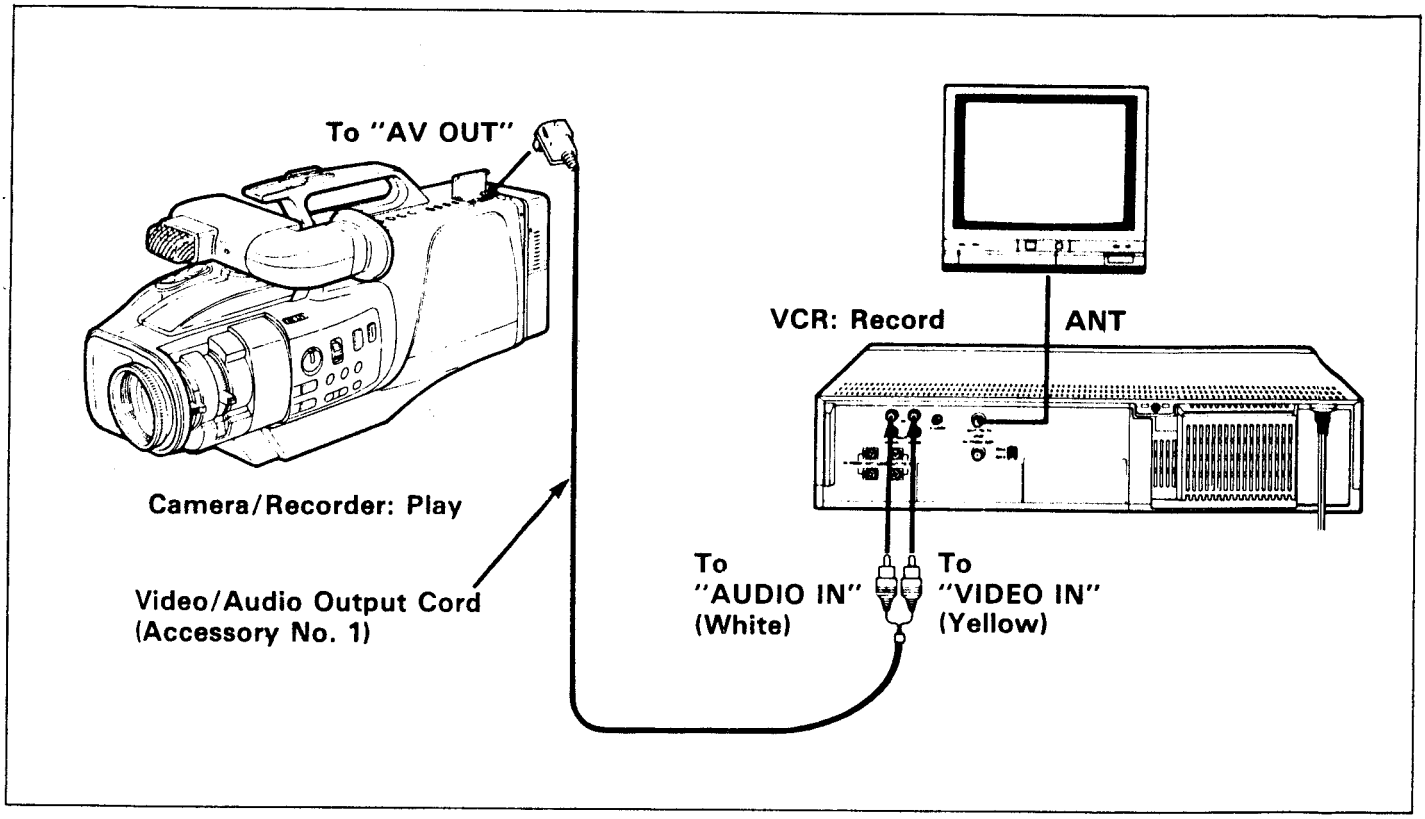
1. Press **"DISPLAY"** button until the linear time counter is displayed.
2. Press **"MEMORY"** button. (The indicator **"M"** appears in the viewfinder.)
3. Start playing or recording a tape.
4. At the point you want playback to start, press **"RESET/T-160/T-180"** button to reset the counter to **"0:00:00"**.
5. Continue to play or record.
6. Press **"STOP"** button.
7. Press **"REW"** button. The tape will be rewound to the preselected point, at approximately **"0:00:00"** indication.

NOTE: The tape will also stop approximately at **"0:00:00"** during fast forward mode.



CAMERA/RECORDER TO VCR DUBBING

If you wish to exchange or copy some of your friend's favorite home recordings, the following instructions can be used to connect camera/recorder to VCR for this purpose.



1. Connect the video/audio output cord to **"AV OUT"** of your camera/recorder.
2. Connect the other ends to **"AUDIO IN"**, **"VIDEO IN"** of your VCR as shown in diagram above.
3. Play the tape on the camera/recorder and record it on the VCR.

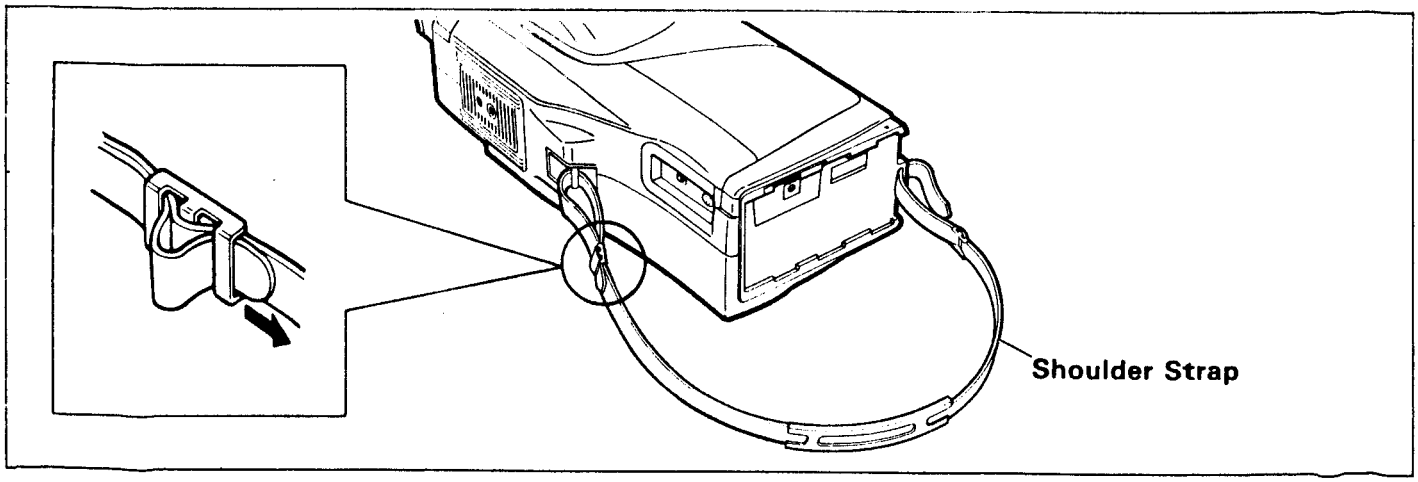
NOTE: If you connect the **"VHF OUT TO TV"** connector of VCR to the **"TV ANT"** connector, as illustrated and set **"VCR/TV"** selector of the VCR to **"VCR"** mode, the picture being dubbed by VCR can be monitored.

FLYING ERASE HEAD

A rotating erase head which eliminates glitches and rainbow noise that occurs at the joints between recorded segments.

HOW TO ATTACH THE SHOULDER STRAP

Attach the shoulder strap (Accessory No. 5), as illustrated.



ATTACHING THE DC CAMERA LIGHT

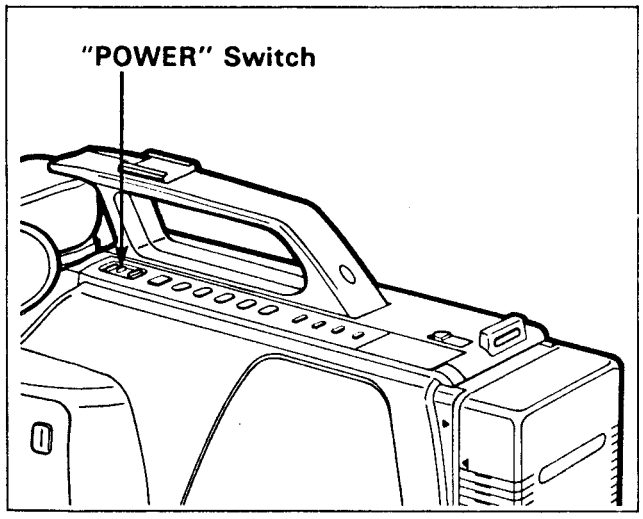
Use the DC camera light if you wish to shoot objects in dark places.

CAUTION: During operation and/or after use of the camera light, the front surface and lamp of the camera light will be very hot. To avoid burns or hair damage, do not touch them.

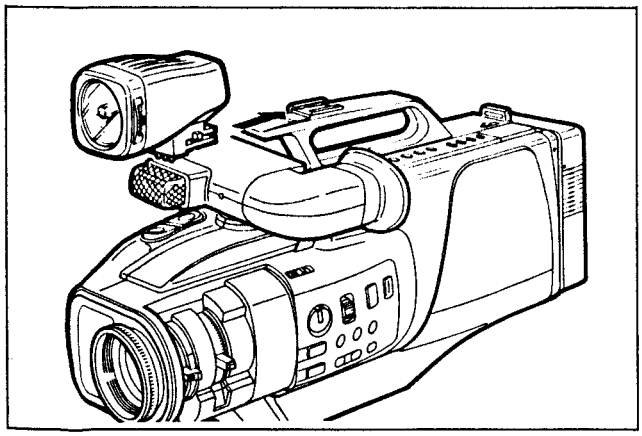
NOTES:

- It is not recommended to use the car battery cord to power the DC camera light by connecting it to the camera/recorder because the cord becomes very hot.
- The power consumption of the DC camera light is much more than that of the camera/recorder. Therefore, if the camera light turns on when a fully charged battery pack is attached, the operation time by the battery becomes less than half.
- When the camera/recorder is turned on, current always flows to the terminal with which the DC camera light is in contact. Never touch the terminal with your fingers in this condition.

1. Make sure that a fully charged battery pack or AC adaptor/charger is attached.
2. Check that the camera/recorder is turned off.

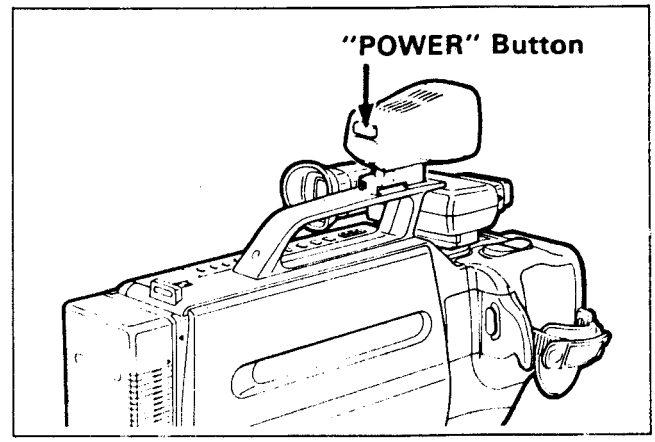


3. Attach the DC camera light to the accessory shoe.

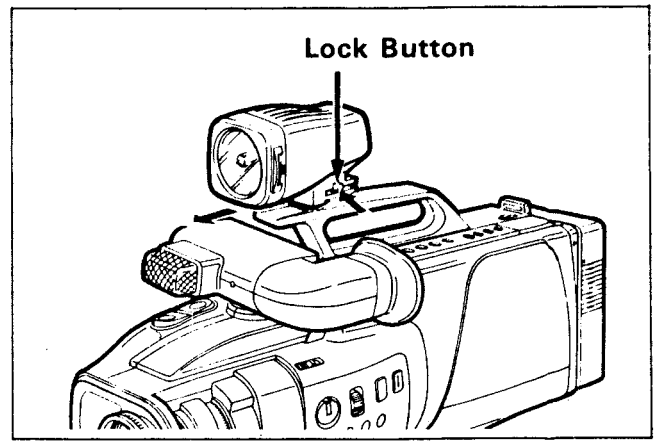


4. Place "**POWER**" switch to "**CAM**" and then press the "**POWER**" button of the DC camera light when required.

   NOTE: Turn on the camera light only when you need it. Otherwise the operation time of the battery pack becomes shorter because the power consumption of the camera light is high.



5. To remove the camera light, slide the camera light to the direction of arrow while pressing the lock button.

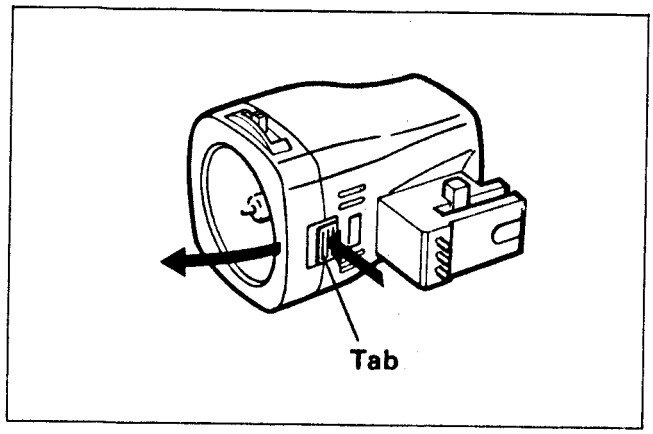


NOTES:

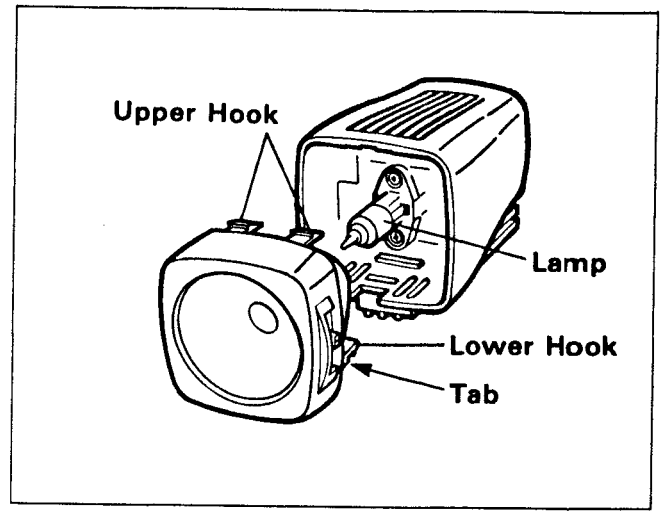
- Replace only with VM-CP10L lamp (optional), to reduce the risk of fire.
- When the camera light is on, do not allow water to drop on the light.
- When the camera light is on, avoid subjecting the camera light to impacts or sharp vibrations.
- Do not allow the cooling vents to become blocked. Also, do not cover the camera light with paper or other objects, since the air flow will be interrupted, resulting in possible overheating hazard.
- Never use the camera light in the vicinity of explosive or highly inflammable materials.
- When storing the camera light in the camera case following use, be sure to allow it sufficient time to fully cool down before placing it in the case.

To remove and replace the front case of DC camera light

■ To remove the front case, press and hold the tab, then remove the front case.



■ To replace the front case, pass the lamp through the hole of the reflection plate then attach the upper hooks to the DC camera light, and then attach the lower hook to the DC camera light while pressing the tab.

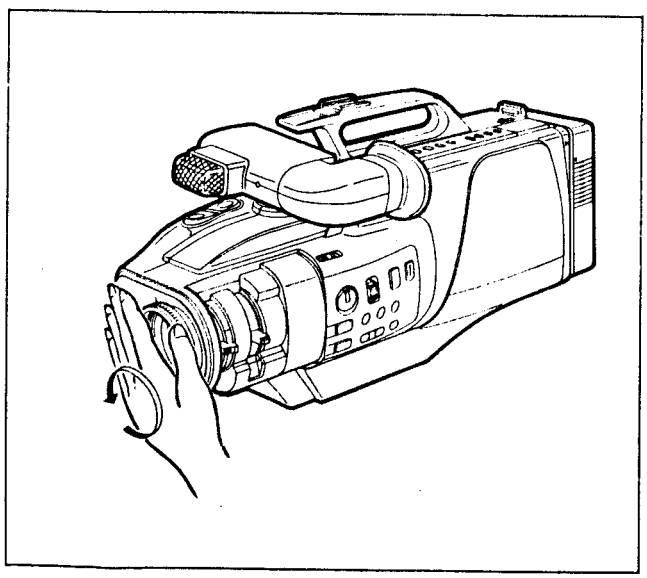


NOTES:

- Do not touch the lamp directly with your fingers. It may shorten its service life.
- When the lamp is replaced, or when the front case of the DC camera light is removed, make sure the front case is attached to the DC camera light properly.

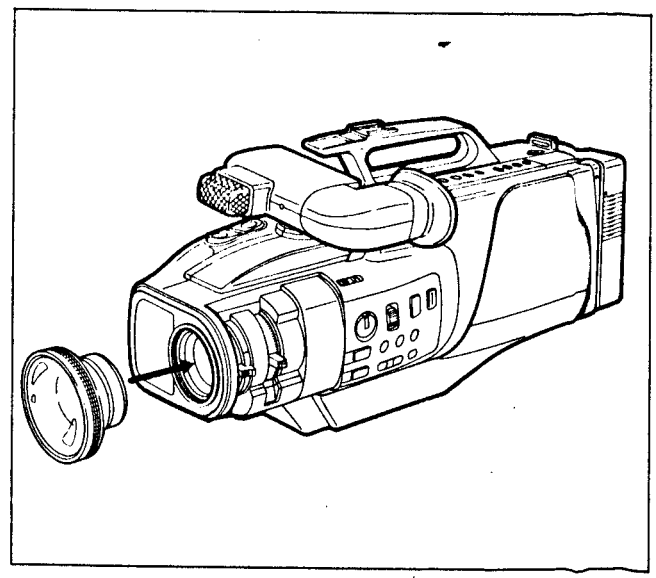
ATTACHING THE TELEPHOTO OR WIDE ANGLE LENS

1. To remove the lens hood, put your hand flat against lens hood and turn it counterclockwise.



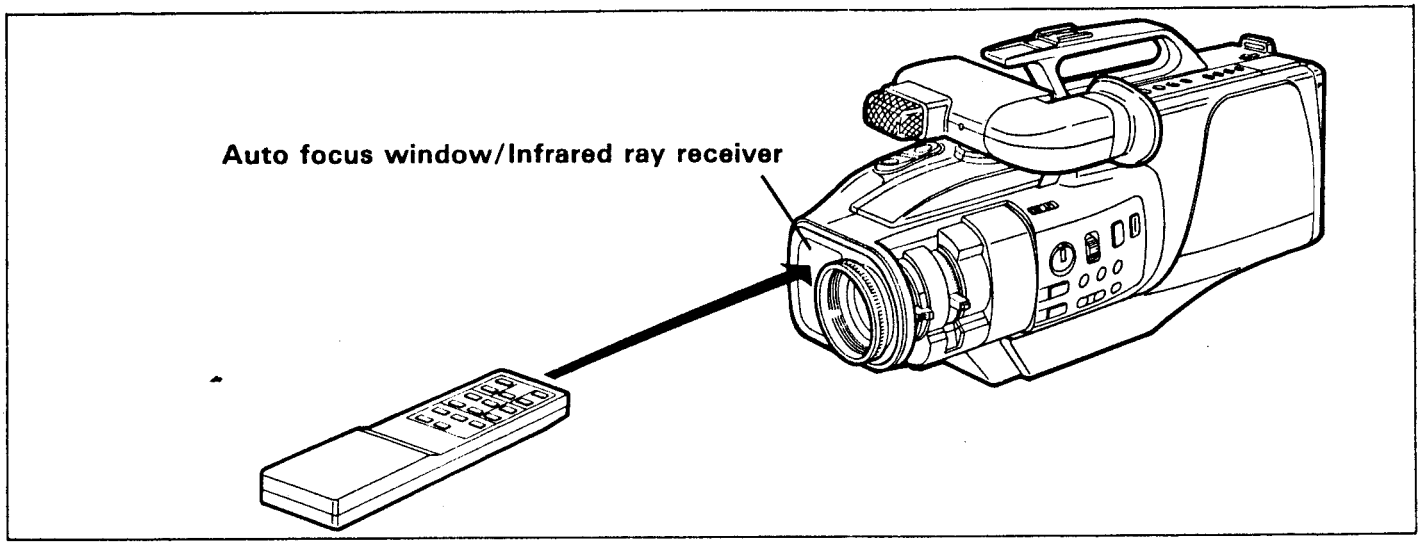
2. Remove both caps of the telephoto or wide angle lens.
3. Screw the lens into the threads on the front of video camera/recorder lens assembly.

NOTE: Auto focusing will not operate correctly when the telephoto or wide angle lens is attached to the video camera/recorder.



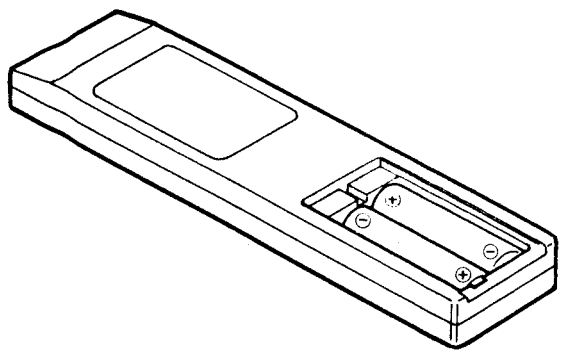
WIRELESS REMOTE CONTROL

You can operate the camera/recorder with the wireless remote control (provided) from a distance.
Aim the remote control at the receiver of the camera/recorder.

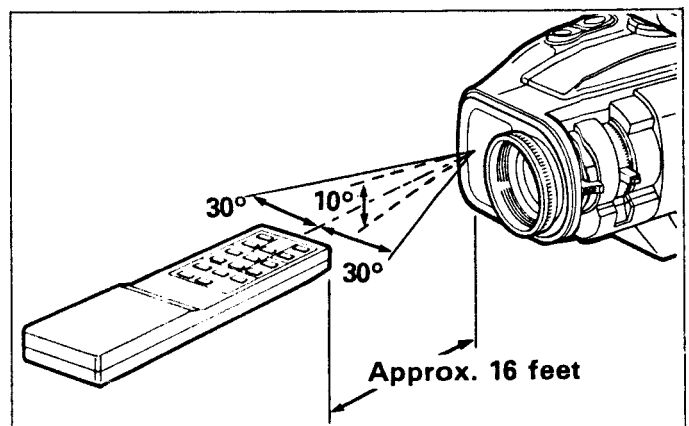


■ How to install the batteries

- Be sure to install two **"AA"** size batteries before use.
- Be careful to install with correct polarity.



■ Remote controllable range

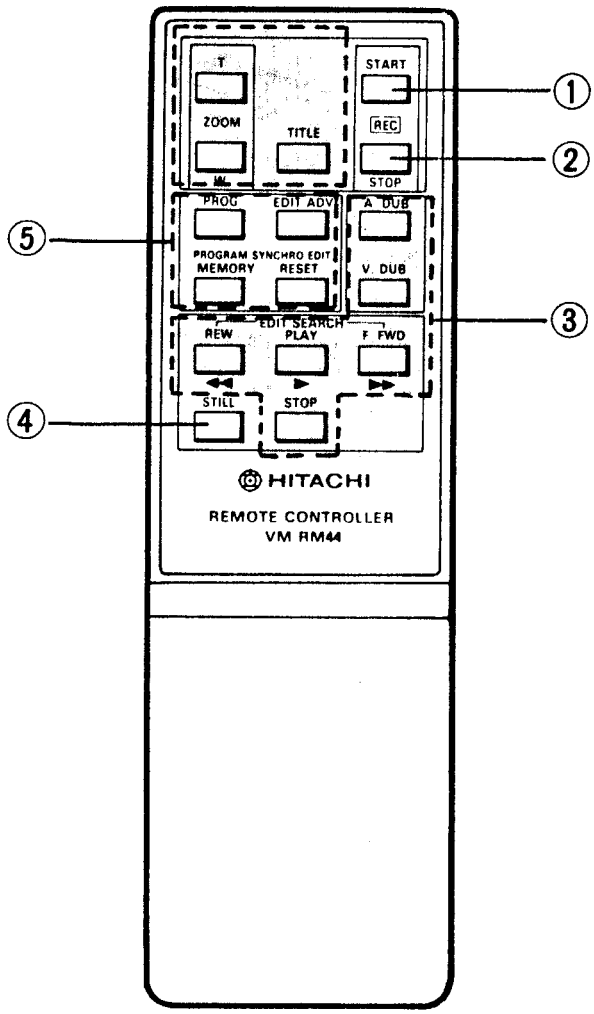


Cautions on batteries

- Do not use the old and new batteries at the same time.
- Do not mix batteries of different types.
- Do not short, take apart or dispose of batteries by throwing into a fire.
- When liquid leaks, wipe it off completely and then insert new batteries.

Cautions on the remote control

- Use the remote control indoors. When the infrared ray receiver is exposed to direct sunlight or strong light such as that from artificial lighting, the remote control may not operate correctly.
- The remote control cannot be operated if there is an obstacle between the remote control and infrared ray receiver.
- The remote control code of this camera/recorder is **"VCR2"**. If the remote control code of your VCR is the same, **"VCR2"**, the VCR may malfunction when this remote control is used.



① **"REC START" Button**
Press to start recording

② **"REC STOP" Button**
Press to stop recording.

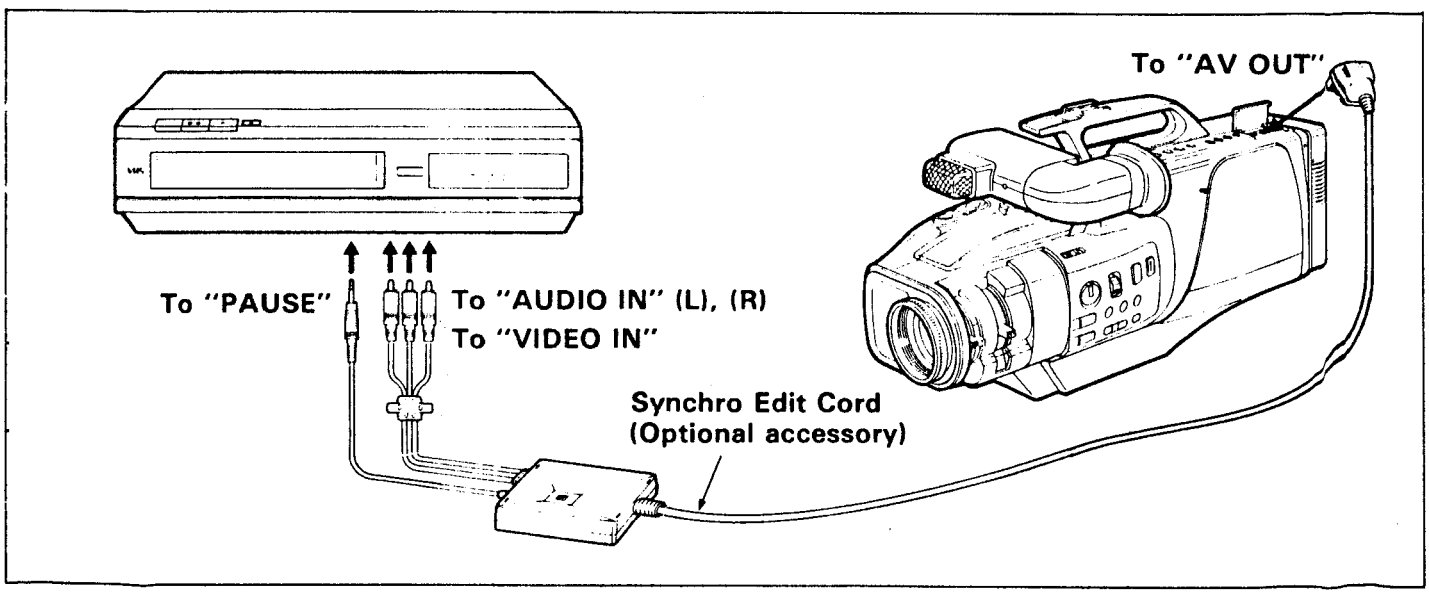
③ The shaded buttons work the same as those on the camera/recorder.

④ **"STILL" Button**
This cannot start or stop recording, differing from the **"STILL (REC/PAUSE)"** button on the camera/recorder.
Press this button during playback. A still picture will be seen.

⑤ **Programmable Synchro Edit buttons**
These buttons allow 6 programmable synchro edit functions together with the VM-CH72 Synchro Edit Cord (optional). (See below)

PROGRAMMABLE SYNCHRO EDIT

■ **Connection**

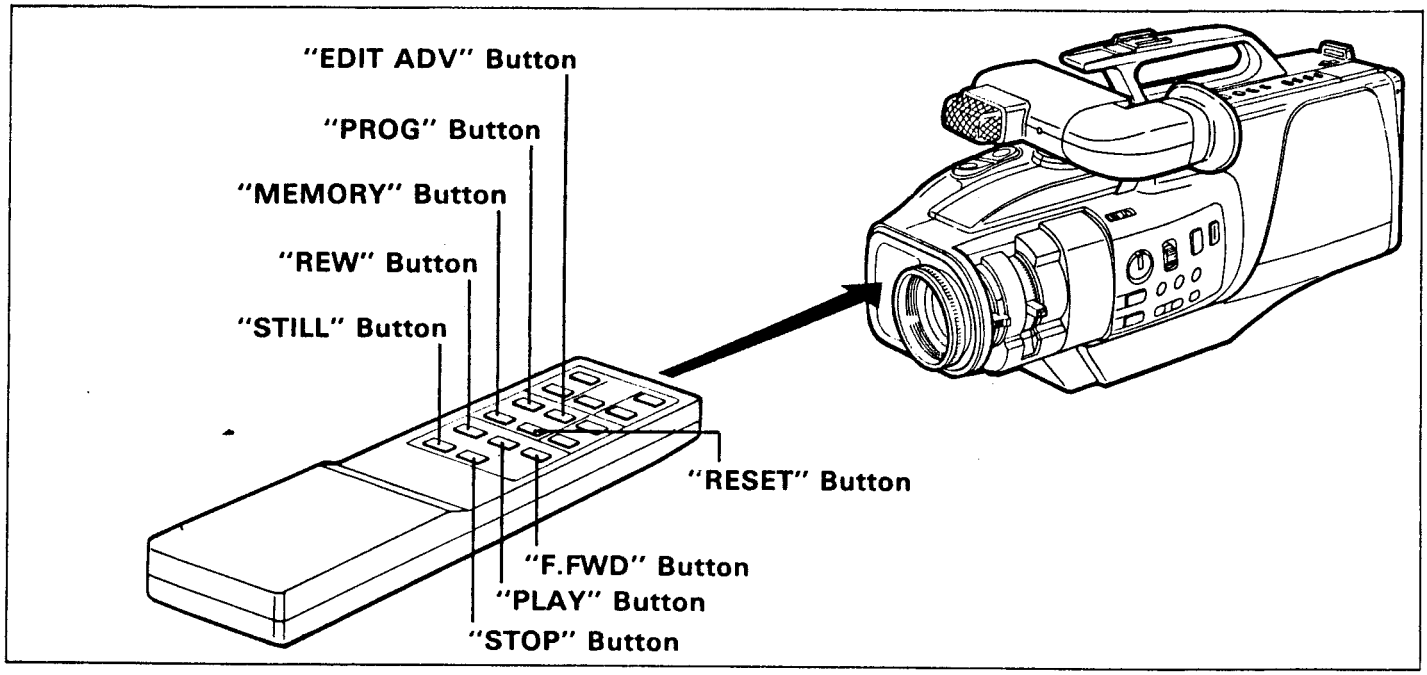


1. Connect your camera/recorder to a compatible VCR as shown above. An optional synchro edit cord is required.

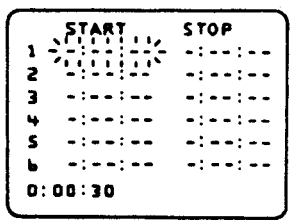
NOTE: If your VCR has a single (mono) audio input, connect either the left or right audio plug to the audio input on the VCR.

■ Operation

Programmable synchro edit allows you to program your camera/recorder to select the scenes you want to copy from a pre-recorded tape. You can select up to six different scenes or segments to copy at one time.

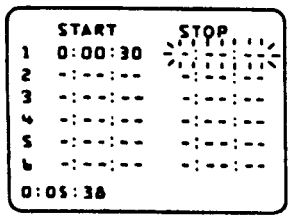


1. Insert a recorded tape into the camera/recorder.
2. Insert a blank tape into the recording VCR.
3. Place **"POWER"** switch of the camera/recorder in **"VCR"** position.
4. Point the remote control at the receiver of the camera/recorder, and then perform the following steps 5–13.
5. Press **"PROG"** button of the remote control. The program menu display appears in the viewfinder.



NOTE: If your VCR is connected to a TV, the program menu will also appear on the TV screen.

6. Press **"PLAY"** button and use **"F.FWD"** or **"REW"** button to search the starting point of the segment you want to copy. Press **"PLAY"** and then press **"STILL"** button to set the camera/recorder to the play pause mode.
7. Press **"MEMORY"** button to store the counter reading. When you press **"MEMORY"** button, the flashing dashes will be replaced with the current counter reading and the next group of dashes will start to flash.



8. Press **"STILL"** again and use **"F.FWD"** button to search for the end of the segment you want to copy. Press **"STILL"** again to set the camera/recorder to the play pause mode.
9. Press **"MEMORY"** button to store the counter reading at the end of the scene.
10. Continue programming as desired above until you have entered up to six different segments. Let the tape run, do not press **"STOP"** button. If it is stopped, editing will not be accurate.
    NOTE: If you wish to program less than 6 segments, press **"EDIT ADV"** button until the flashing indicator disappears from the viewfinder.
11. Press **"RECORD"** button of the VCR. The VCR automatically enters the record pause mode.
    NOTE: If the VCR begins to record instead of pausing, you will have to change the position of the switch on the synchro edit cord. Stop the VCR, change the switch, and then press **"RECORD"** button of the VCR again.
12. Press **"PLAY"** button of the remote control during playback. Programmable synchro editing starts.
    - The camera/recorder automatically searches for the beginning of the first segment and resumes playback. The recording VCR automatically starts recording.
    - After recording the first segment, the camera/recorder automatically searches for the beginning of the next segment and resumes playback. The recording VCR is automatically released from the record pause mode and resumes recording.
    - It continues recording and pausing until all the programmed segments are synchro edited.

13. When programmable synchro edit is finished, the camera/recorder will enter the stop mode, and the VCR will enter the record pause mode.
NOTE: The programmed data is held in memory if the camera/recorder is not turned off.

■ **Changing the Synchro Edit Program**

1. Press **"PROG"** button to display the program display.
2. Press **EDIT ADV"** button repeatedly until the data you wish to change flashes.
3. Press **"RESET"** button to delete the incorrect data.
4. Locate the place on the tape that you want to enter and press **"PAUSE"** button to set the camera/recorder to the play pause mode. Press **"MEMORY"** to store the correct counter reading.
5. Press **"EDIT ADV"** button repeatedly to remove the flashing indicator from the display.

■ **To End Programmable Synchro Edit**

Press **"PROG"** button to end programmable synchro edit and remove the program display from the viewfinder.

SYNCHRO EDIT

Synchro edit allows your camera/recorder to control a compatible VCR (one that has a camera pause jack) while tapes are being copied from the camera/recorder to the VCR.

1. Connect your camera/recorder to a compatible VCR as shown on page 45.
2. Insert the recorded tape into the camera/recorder.
3. Insert the blank tape into the recording VCR.
4. Press **"PLAY"** button on the camera/recorder and then press **"STILL (REC/PAUSE)"** button where you want to copy.
5. Press **"RECORD"** button on the VCR. The VCR automatically enters record/pause mode.

   NOTE: If the VCR begins to record instead of pausing, you will need to change the position of the switch on the synchro edit cord. Stop the VCR, change the switch, and then press **"RECORD"** button on the VCR again.
6. Pressing **"REVIEW"** button on the camera/recorder puts the camera/recorder in the review mode for several seconds and then into the playback mode. The recording VCR starts recording automatically.
7. Pressing **"REW"**, **"F.FWD"**, **"STOP"** or **"STILL (REC/PAUSE)"** on the camera/recorder automatically put the VCR into the record/pause mode. This allows you to search (forward or backward), fast-forward or rewind the tape in the camera/recorder without disturbing the tape in the VCR.
   - To search forward (or backward), press **"F.FWD"** (or **"REW"**) button. When you press **"PLAY"** button, the camera/recorder will resume normal playback. To begin copying again, press **"STILL (REC/PAUSE)"** button and then the **"REVIEW"** button.
   - To fast-forward (or rewind) the tape, press **"STOP"** then **"F.FWD"** (or **"REW"**). To begin copying again, press **"STOP"**, then **"PLAY"**, then **"STILL (REC/PAUSE)"** to pause the camera/recorder, and **"REVIEW"** to begin copying.

AUTOMATIC REWIND

When the tape reaches its end during playback, it automatically rewinds to the beginning and stops.

TROUBLESHOOTING

Your camera/recorder is a highly sophisticated instrument. It has been carefully checked and adjusted at the factory under the most rigid quality control and inspection systems. However, should problems develop, check the following points and take necessary corrective measures.

INSERTING OR REMOVING THE CASSETTE

Symptom	Check Point & Correction
Cassette holder cannot be opened when you press "**EJECT**" button.	* Connect the power source.
Cassette cannot be inserted into cassette compartment.	* Load cassette in direction indicated by arrow on cassette.
	* Cassette window must be toward outside.

CAMERA RECORDING

Symptom	Check Point & Correction
Picture does not appear in the viewfinder.	* Remove the lens cap.
	* Slide "**POWER**" switch to "**CAM**".
	* Set "**FULL AUTO**" switch to "**AUTO**".
	* Disconnect the video/audio input cord from the camera/recorder.
	* Rotate the electronic viewfinder into the operating position.
The camera/recorder can not go into the recording mode, even when record start/stop button is pressed.	* The cassette has had the erase prevention tab removed. Stick a piece of cellophane tape over the erase prevention hole or select a different cassette.
	* Set "**POWER**" switch to "**CAM**" position.
	* Rotate the electronic viewfinder into the operating position.
Picture is out of focus. Auto-focus does not operate.	* Set "**FULL AUTO**" switch to "**AUTO**".
	* The camera/recorder is set to MACRO mode. Release the MACRO mode, and then focus on the object.
	* Auto-Focus does not operate if the wide angle or telephoto lens is attached.

RECORDING TV PROGRAMS OFF THE AIR

Symptom	Check Point & Correction
The camera/recorder can not go into the recording mode, even when record start/stop button is pressed.	* The cassette has had the erase prevention tab removed. Stick a piece of cellophane tape over erase prevention tab hole or select a different cassette.
	* Set "**POWER**" switch to "**CAM**" position.
	* Connect the camera/recorder and TV (or VCR).

PLAYBACK OF PRE-RECORDED CASSETTE

Symptom	Check Point & Correction
"**PLAY**" button cannot be engaged.	* Set "**POWER**" switch to "**VCR**" position.
No picture appears on television screen when "**PLAY**" button is pressed. (TV is connected to the camera/recorder by using RF converter unit.)	* Set the television to the camera/recorder channel (3 or 4) depending upon the selected channel on the RF channel select switch of RF converter unit.
Interference on playback picture.	* Adjust "**TRACKING**" control.
	* When you see the playback picture on your TV, adjust fine tuning knob on television set to obtain best picture.
	* The pre-recorded tape is EP or LP recording. This camera/recorder is for use in SP recording only.
Picture bends at the top of TV screen.	* TV receiver is of older type. It needs to be modified to work properly with camera/recorder.
	* Tape is damaged. Try another cassette.
Color of your TV screen is too bright, too faint or change.	* TV set has VIR circuit. Turn it off during playback.

DEW LIGHT

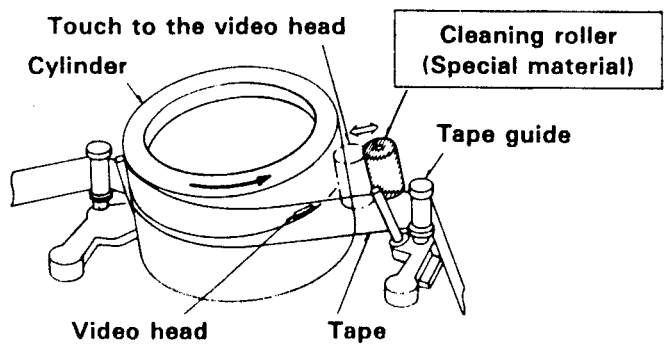
Symptom	Check Point & Correction
"**DEW (POWER)**" light flashes. The "**POWER**" light flashes to indicate "**DEW**" is present.	* Condensation on the camera/recorder mechanism — wait until the unit has reached normal room temperature, and condensation has dried. "**DEW (POWER)**" light will then stop flashing.

BATTERY CONDITION

Symptom	Check Point & Correction
The " ▬ " indication in the electronic viewfinder flashes to indicate battery is discharged.	* Try another battery or charge the battery.

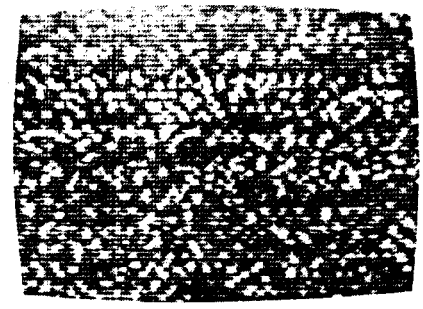
AUTO HEAD CLEANING

This system cleans the video heads automatically when a cassette is inserted to prevent dirt from accumulating on the heads.



HEAD CLEANING

- Picture playback may become blurred or be interrupted. This does not mean that the recorded program has been erased.
- Dirt accumulated on the head after long periods of use causes this problem. Since this camera/recorder uses an auto head cleaning system, dirt does not often adhere to the heads. When it is difficult to remove dirt using this system, head cleaning requiring highly technical care is necessary.
- Consult your nearest dealer or VCR service center before using a head cleaning tape. Wet-type head cleaning tapes cannot be used with this camera/recorder.



PERIODIC MAINTENANCE

The video camera/recorder is a precision electromechanical device which will require periodic maintenance after a period of normal use. We expect that no maintenance other than head cleaning will be required during the warranty period by most users, unless the video camera/recorder is heavily used or seldom used. Normal maintenance is the responsibility of the user, although defective parts are covered during the warranty period. Consult your VCR service center to determine recommendations for normal maintenance based on your location, use patterns and machine age.

SPECIFICATIONS

■ General

Power requirements	9.6V DC
Power consumption	8 watts (nominal)
Dimensions	5-3/8"(W) x 7-11/16"(H) x 15-5/16"(D) 136(W) x 195(H) x 389(D) mm
Weight	4.9 lbs (2.2 kg)

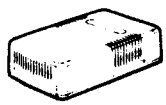
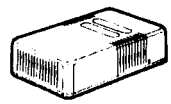
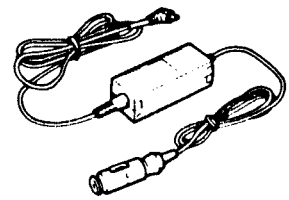
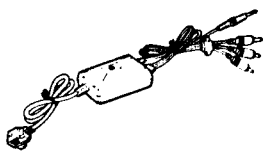
■ Video Recorder Section

Format	VHS
Record/playback system	Two video record/playback heads plus a flying erase head
Video signal	EIA standard NTSC color
Tape speed	33.35 mm/sec.
Video input	1.0 Vp-p, 75 ohm
Video output	1.0 Vp-p, 75 ohm
Audio input	−7.8 dBs (316 m Vrms), more than 47K ohms
Audio output	−7.8 dBs (316 m Vrms), less than 1K ohm
Fast forward/rewind time	Less than 10 minutes with T-160 cassette

■ Camera Section

Scanning	525 lines/60 fields/30 frames
Required minumum illumination	2 lux
Pickup device	1/3" C.C.D.
Lens diameter	46 mm

OPTIONAL ACCESSORIES

Battery Pack (for standard play) VM-BP66	Battery Pack (for long play) VM-BP67	Car Cord VM-CC70A	Lamp for Camera Light VM-CP10L
			
Synchro Edit Cord VM-CH72	**Wide Conversion Lens VM-CL30W**	**Telephoto Lens VM-CL50T**	
			

If you use the video camera/recorder and AC adaptor/charger in an area with a voltage other than 110 – 127V, use a power plug adaptor as shown in the figure.